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Curious item.

This seems to be a remarkably curious copy in that it has two distinct copies of p. [3] of the "Contents", thus shewing there must have been more than one edition or impression.
This copy ends with p. 301, but the reverse of it (which has been pasted over with a sheet of paper), is headed "C2" & "An Almanack for 1836," making it look as if this the 2nd state altered to make it into a "1st edit", but with the additional p. [3] bound in in error when it was decided to leave out pp. 302–321.
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[3]

RURAL AND DOMESTIC ECONOMY.

MISCELLANEA.

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& will [illegible] on p. 321 or later.

Baxter's COLOUR PRINTING, 3, Charter House Square, London.

SOUTH DOWN SHEEP,

FROM THE FLOCK BELONGING TO THE LATE JOHN ELLMAN, ESQ.

BAXTER'S

AGRICULTURAL

AND

HORTICULTURAL GLEANER.

London:

SIMPKIN, MARSHALL, AND CO. STATIONERS' COURT.

BAXTER AND SON, LEWES.

1836.

BAXTER'S

AGRICULTURAL

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GLEANER.

Baxter's OIL COLOUR PRINTING,
3, Charter House Square, London.

?- 2nd edit.

London:

SIMPKIN, MARSHALL, AND CO. STATIONERS' COURT;

BAXTER AND SON, LEWES.

1836.

THE

AGRICULTURAL AND HORTICULTURAL

GLEANER,

CONTAINING

IMPORTANT DISCOVERIES AND IMPROVEMENTS

IN

FARMING, GARDENING,

AND

FLORICULTURE,

WITH

PRACTICAL DETAILS CONNECTED WITH RURAL

AND DOMESTIC ECONOMY;

ALSO A

MISCELLANEA,

COMPRISING AGRICULTURAL, HORTICULTURAL, AND FLORICULTURAL CALENDARS, ABSTRACTS OF ACTS OF PARLIAMENT PASSED DURING THE LAST SESSSON, &C. &C.

"The improvement of the Ground is the natural way of obtaining riches."—BACON.

Sussex Agricultural Press:
BAXTER AND SON, LEWES.

1836.

The Publishers having collected, at great expence, the valuable practical information which forms the contents of the present volume, are induced by the suggestions of those who appreciated its value when published as their Annual, to furnish the Public with these useful Agricultural and Horticultural articles under the present title.

Should the Reader wish for still greater sources of information upon any of the subjects, the Publishers strongly recommend them to refer to the "Library of Agricultural and Horticultural Knowledge," a Work which is purely practical, and upon which the Agriculturist may place the strictest reliance.

[1.]

CONTENTS.

AGRICULTURE.

AGRICULTURE

ORIGINAL REMARKS ON THE EFFECTS OF LIGHT AND ELECTRICITY IN CONNECTION WITH THE PHENOMENA OF VEGETATION.

BY MR. TOWERS, C.M.H.S., AUTHOR OF THE DOMESTIC GARDENER'S MANUAL.

Every one is aware of the value and importance of manure to land of most descriptions: Some indeed,—the supporters of the Tullian system of Agriculture,—appear inclined to believe that, deep, and frequent tillage,—as ploughing, harrowing, hoeing,—all of them mechanical processes,—will go far to obviate the necessity and application of manuring substances: others assert that, land of a certain natural quality, in a few rich vales—as, for instance, those in the neighbourhood of Taunton in Somersetshire, and in some low alluvial districts of Berkshire and Buckinghamshire,—are naturally so constituted, as scarcely to require the artificial aid of decomposable substances. These opinions may be quoted as trifling exceptions to a general law, and fully established practice.

It is confirmed by unerring experience that, crops deteriorate, and land becomes poor, and out of heart, unless the soil be assisted by the addition of certain substances which are convertible into vegetable aliament: I take it as granted, that the foregoing is a position which cannot be philosophically assailed.

But though this be admitted, we have thereby acquired no knowledge of causes: the enquiry concerning the mode in which manures act, remains unanswered. It is the object of this article to excite investigation, and to induce a spirit of experimental practice, in opposition to the mere empirical routine, which paralyses science and leaves the mind inert and indolent, and averse from rational improvement.

During my investigations of soils and vegetable substances I have detected certain results that have induced me to entertain opinions, which, though it is probable they may have occured to others, do not appear to have been publicly stated, and canvassed. I therefore, entertain little doubt that, the views which I shall now briefly explain will startle many and appear perfectly visionary; but let such persons be assured that, I do not assert any thing; still less that, I desire to impose my opinions dogmatically upon any one. Experiment has taught me certain facts; and my mind is naturally inclined to question the weight and validity of those assertions which have passed current as sound doctrine: hence I have been led, after mature reflection, to arrive at conclusions which may appear totally at variance with commonly received opinions.

Heretofore, Chemistry had not materially assisted the agriculturist or gardener: it had analysed substances, and discovered that certain matters might be wanting to a soil, which, were they added, would supply the deficiency; but it could not provide for the absence of these substances, nor remove the insuperable difficulties that often prohibited any efforts to procure them. Of late years, however, and particularly since the amazing experiments in electricity, by Mr. Faraday, we begin to perceive, that all nature is imbued with a peculiar essence or matter whose agency is unceasing and uninterrupted. To this essence the term *Electricity*,—though conventional, and perhaps admissible enough when applied to the phenomena excited by our philosophical machines—is inappropriate, when we attempt to describe the vast operations of the great natural agents,—being utterly feeble, and inadequate to express or interpret the facts with which it has to grapple. All nature is replete with LIGHT, *pure solar light*, a flood of which has been poured upon the world from the period of the first created beam. To this etherial agent, (of the existence of which many of the philosophers among the Ancients had more than mere imaginings,) we must turn, if we hope to explain the phenomena which surround us. The universality of the essence of light in all material substances, is a position that, I believe will now be conceded to me without much opposition; and if it be admitted, we obtain a point whence to start, a foundation upon which to erect a superstructure that cannot readily be shaken. I seek no other; and rest the validity of my hypothesis solely upon the universality, and unintermitting agency of light, which I regard as NATURAL ELECTRICITY, the primary source of all the phenomena of heat, decomposition, assimilation, nutrition,—and not to stop here—of gravitation or attraction.

Manuring substances,—to descend from generals to particulars,—are in the language of chemists, composed of,—or more properly speaking—resolvable into, oxygen, hydrogen and charcoal, (*carbon*) and into these also vegetable bodies are almost totally reducible. If the body that is nourished and supported, be found to consist of, or to yield substances precisely of a similar nature to those which nourish it, it would appear rational to conclude that, the nutritive matters of the

latter are taken up by the absorbent vessels of the former, and to this conclusion vegetable physiologists have arrived. But if all the facts which have been collected, and those which may be detected by analysis and close investigation, be accurately examined, it will appear that, the inference deduced is involved in much error or uncertainty.

Experiments fairly conducted with *living plants growing in natural situations,* afford proof that, these do not absorb manuring substances, nor coloured infusions, nor chemical solutions; yet, it has been asserted that they do take up some, or all of these! We are prepared to admit that, plants in a morbid condition, or unnaturally situated, or stimulated by agents foreign to, or which oppose, the functions of the vital principle, may appear to absorb certain substances: thus, cuttings, which are mere mutilations, plants removed from soil, and their bare roots exposed to the action of fluids; others, under the stimulus of electrical currents artificially excited, may receive coloured and medicated fluids; but all such experiments, and excitations are just so many delusions; and instead of promoting the cause of scientific enquiry, tend only to sophisticate, and to mislead the understanding.

When manuring substances are placed in the ground a very surprizing change is effected; of this any one may convince himself by incorporating any quantity of maiden or pure loam with a like quantity of fresh stable manure; it will not be of any consequence whether the long straw and litter be used or not, with the pure dung; but the effects will be more manifest if straw and all be taken. Let both the materials be well mixed, laid in a heap under a shed and turned once a fortnight; and if any moderate degree of moisture exist—(a wet state is by no means desirable,) the whole will, in three or four months, be reduced to one homogeneous mass of earth. If vegetation were brought to bear upon the mixed substances, the processes would be more speedily effected. The result as I have described it, has come under my own inspection, and leads us to conjecture how manures act, and are acted upon. Earths are metallic oxides; manures and vegetable matters are reducible into oxygen, hydrogen, carbon, and some azote; this has been seen and asserted, till the subject has almost become stale; but it has not been so often said that, *in the slow processes of nature,* vegetable and animal matters are reducible into *earths*: yet such is the fact; and it is doubtless, during and by this reduction,—effected by the agency of vegetable vital action,—that, sap is generated, and the staple of the ground restored and maintained. No one can exactly comprehend what vegetable life is: a mystery hangs over it; and the human mind may never be permitted to unravel the wondrous clew. However, as we gain an insight into the all pervading influence of light; as we penetrate the veil that has, till lately, obscured the agency of electricity, we begin to perceive a glimpse of what may be the power which excites vegetable action, and effects the decomposition of those substances which are resolvable into the food of plants.

The vast experiments of Dr. Faraday have satisfied him that, the

elements of a single grain of water are held together by a volume of electricity equal to that which is revealed by a powerful flash of lightening; and these experiments have been laid before the Royal Society, and are published in the Philosophical Transactions, and also in a separate work called—"Elementary Researches in Electricity," Such facts need not startle any mind that has dwelt upon the universal distribution of solar light, and considered the impossibility of the loss, or extinction, of one single particle of it. Let us then be convinced that, phenomena of the most familiar nature are at hand, and of constant occurrence, which prove that light,—etherial fire,—the *cause* of heat,—imbues all matter, and is treasured up to produce the most beautiful, as well as the most mighty effects.

Among these, I view the entire chain of all the phenomena of vegetation, the development of parts, and their growth, nourishment, and final expansion, as some of the most certain, and harmonious. If we hesitate to admit of SENSITIVE LIFE, we require some other powerful, and efficient motor; and we find it in LIGHT. Now, it appears to be proved beyond the reach of doubt, that chemical action is the result of electrical energy; and as the decomposition of manuring substances is a chemical phenomenon, it follows, if the hypothesis of electrical action be admitted, that the processes of laboration within the soil are induced by electricity. The source of that mysterious power is the sun,—vegetable structure the medium, and vegetable development one of the grand results.

But in these processes manure either solid, or in a state of simple solution, is not taken up by the plant; for no human power ever yet effected the introduction of a particle of such matter within the cellular organs. The manure is indeed decomposed; but water of a peculiar nature, or at least, insipid, colourless, sap,—exhibiting all the qualities of water,—is generated. As to the carbonic acid, and the substance or matters which have been detected, and which,—as in the raw sap of the birch—tend to run into fermentation; these, all may be ascribed to the imbibition, or admixture of certain portions of the true, *laborated* sap or *proper juices* of the plant, (the product of electric vital action in the leaves,) with the raw fluid, absorbed by the roots. The elements of water are at hand, and it may be questioned whether water be not the final result, as well as the primary source of all things. Watery sap is then prepared and taken in; so far the plant is immediately concerned; but there is another and ulterior process, and that is, the *preparation and renewal of the Soil*. A law of nature, which appears to be paramount, ordains that, the staple, the heart of the ground, shall be kept up, if man require it, to yield him "the fruits of increase." Land must be tilled, it must be manured; and if the husbandman faithfully, and adequately perform his part, vegetation is supplied; and by the energy of that power which promotes its developments, the radical system acts upon the decomposable substances, reduces them to earths,—that is to metallic oxides, such as chalk, alumen, or the pure

matter of clay, silex, iron, &c. and in those proportions, which may exactly suit the matrix, the natural bed of soil wherein the several processes are effected.

Such appears to me to be the true agency of manures, and we may, I believe, seek in vain for other causes of those astonishing effects which we daily witness. Science, I admit, is in its infancy,—and man,—the wisest and most learned,—*knows* but little. However, we I trust, advance, and are getting rid of those prejudices of mere routine which have long cramped and bewildered the understanding, and the judgment.

G. J. T.

MEANS OF OBTAINING FINE PERMANENT PASTURE.

BY JOHN BOSWELL, ESQ.

The writer of the following remarks "*On the unprofitableness of old pasture compared with new,*" after having alluded to the unsuccessful attempts he had made to improve his pasture land by the accustomed practices, observes :—

My love for permanent pasture was now shaken—I began to be awake to the folly of wasting time and money in top-dressing, when a good and profitable corn-crop would cause the same land to carry fine grass, and bring a much greater rent. I now ventured to hint to some of my friends, that breaking up the ground appeared to me a much more easy way of producing good grass, than all the composts that could be put on. Few would even listen to me, and I was brought up with an exclamation, "Oh, I assure you, there is nothing like fine old grass, it is so close in the bottom, it has so much more nourishment in it. This opposition has led me deeply to consider the matter, and to look out for facts, some of which I shall adduce.

It appears to me, that it is only on certain soils and situations, that pasture can be allowed to remain without great loss; that such situations are flat meadows, or the neighbourhood of rivers or streams, rich in alluvial soil, and the natural habitat of the pasture-plants, or in the vicinity of large towns, where manure has been applied till the ground could not bring a grain-crop to maturity; and that on all other situations, recourse must be had to the plough, so soon as a failure in the grass-crop takes place; the breaking up will entirely depend on the quality of the land and manner in which it has been treated, there being no such true *unerring* guide to the *quality* of land, as the length of time it can profitably be left in pasture. If permanent pasture be the object, I would earnestly recommend to all and sundry the careful perusal of, and strict adherence to, the rules laid down in Mr. Smith of Deanston's admirable paper on frequent draining and subsoil ploughing, in the pamphlet published by Messrs. Drummond, nurserymen at Stirling, being firmly convinced, that implicitly following his advice will be the first step towards making land capable of remaining any length of time in good pasture; for it is altogether impossible, that,

without draining and deep ploughing, good grass can be produced. Little need be said on the unprofitableness of old pasture to the actual farmer. There is little old grass to be found on the farm of a man who has rent to pay; but to the amateur, who may not be quite so much alive to the loss he sustains, I would ask, Have you never remarked the difference of rent that is given by a grazier or butcher, for a field of new and a field of old grass? Have you ever put the question to yourself, Why is this? I shall give you the answer: Let both fields be shut up and cut for hay, weigh the produce, see the great difference in favour of the new grass, and the secret is out. Still keep the cattle from the fields; look at the new grass, how soon the aftermath springs! Well, then, is not the overplus of the hay that which would have fed so many more cattle? and yet people prate about old grass. But some will say, That is very well for profit, but we want beauty; you have no close bottom in your new grass. I answer, put the ground under a good rotation, drain it well, plough it deep, and when you have it ready, apply to Mr. Lawson, the well-known and enterprising seedsman to the Highland Society of Scotland; tell him the nature of your soil, and I answer for it, he will send you such "a mixture" as will produce you a green carpet the very first year that no Genoa velvet could surpass.

Not only is the produce of an acre of new grass far greater than that of an acre of old, but it is more palatable to the cattle, and, as far as I have been able to observe, exactly in the ratio of the age of the grass. An example of this came lately under my notice: A tradesman occupied a field, which he cultivated regularly—breaking up a bit, green-cropping it the following year, and then sowing it down, after which he pastured it by tethering his beasts. The man leaving the place, I caused some hurdles to be put round the bit not in grass, and let the rest of the field in pasture. The cattle, during the whole of summer, ate the new grass to the very earth, and did not taste the older, until the force of hunger made them do so. Next season, the bit which had been hurdled off was sown out, and allowed to go with the rest of the field. The very same thing took place—the new grass was first eaten, and then that which was older. I had an opportunity last summer of observing the marked preference which sheep give to younger grass, compared with old, by putting cattle into two fields, separated by a fence only,—one of very fine grass of some years' standing, the other only three years old, and, pulling out some of the lower rails of a communicating gate, permitted forty sheep to pass through, and pasture in whichever field they pleased. The result was, they were constantly to be found in the field of younger grass, and very seldom went into the old grass enclosure. At last I was forced to shut them into the old grass, finding they were reducing the feed in the one, and leaving too much in the other. Be it always remembered, that land must be well laid down. If grass, however new, be growing on poor land, or wet, or on land that has been badly cleaned, cattle do not relish it. I have seen frequent instances of this. More particularly do they dislike pasturing on foul land.

I have several times allowed small farmers—or crofters, as they are called—to put the whole of their last year's manure on the bit of ground that ought to have been made into green crop—had they not been quitting their possessions—under the promise that they would give it one or two extra ploughings and harrowings, and sow it down with grass-seeds. This bit of ground, although well manured, and sown with good grass-seeds, having only got a sham of a cleaning, was of course full of knot-grass, couch, and other weeds. I have observed that cattle constantly shun it, although almost pinched with hunger.

I have now endeavoured to prove that new grass is not only of greater value, but that it is also more palatable to cattle. There is yet another point in which new grass excels old, and that is the early verdure in spring, and the long continuance of that verdure in the fall of the year. I was once greatly struck with this on the lawn of a highly valued friend of mine, who farms pretty largely, and who spares neither trouble nor expense to procure fine grass round his house. This gentleman had applied all sorts of compounds, in large quantities, as top-dressing to his lawn, particularly gypsum, rich earth, &c., and, by means of these, had grass much superior to what is generally to be seen in spring; but it so happened, that having made some alteration on his house the preceding summer, the workmen had destroyed a portion of the grass on one side of the house, and my friend had been forced to dig this part over, and to sow it afresh. He was well acquainted with the value of the natural grasses, and a mixture of them had been used. The consequence was, that early in April, when we were looking at it, there was a little bit of most beautiful grass, far before the rest of the lawn in verdure and earliness. I called the attention of my friend to the verdure of this patch, and to the advantage of renewing the grass on the rest of the lawn by digging it up. He could not help admitting the superior verdure of the part that was dug,—it was, indeed, too evident to deny; but, on my endeavouring to point out to him that he might have all his lawn just as green, if he would break it up, he shook his head, and said that was a serious concern—he did not know about that. With such-like answers, and with proof daily before his eyes, the lawn remains just as it was.

I had frequently heard of some fine old pasture at the seat of a nobleman, which had never been seen under the plough, not even by that venerable personage—" the oldest inhabitant of the place," The first week of July last, I went to see this wonderful old pasture. What was my astonishment, to find a large tract of very fine land covered with *white grass*, the green tinge of spring hardly taking any thing from the bleached appearance of the ground. Instead of a green prairie alive with stock, finding at that season of the year ample food, a few deer (which I learned had been brought through the winter at a great expense of hay and turnips, carted in for them), and half a dozen of horses, picking a scanty subsistence, were the whole stock a park of noble extent could keep!

On conversing with the land-steward, he informed me that it was

so old, and the grass, in consequence, so long rising in spring, it was proposed to break it up, in order, as he said, 'to renew the grass.'

I am fully aware, that in the front of villas, or round the castles of our nobility, it would not answer to have a three-shift course,—'white, green, white;' and that the ground, in such situations, must remain in grass, like old plate on the sideboard, the bullion in the one case, and the soil in the other, being locked up as to use, and destined to perform a part in the pageant and circumstance of rank, until some spendthrift heir send them both a whirling round the wheel of utility. But if there is to be grass land in the front of the castle or the villa, why should it not be the best? His Lordship would be ashamed to have tarnished plate; why should he have yellow grass? I see no reason why the one may not be in as good a state as the other. I take it for granted, that the man, whoever he may be, who *condemns* his ground to *permanent pasture,* is regardless of money; and that he would willingly bestow any sum on top-dressing, to have that pasture *good*:—well, then, dig over the ground, and give one quarter of the manure which would have been employed in top-dressing; send for 'Lawson's lawn mixture;' and, in a shorter space of time than the ground would have been ugly and brown under the top-dressing system, the most beautiful verdure will be produced—to say nothing of the employment of several industrious men, who would thereby be enabled to earn an honest livelihood for themselves and their families. Of course, this spade-work I only prescribe, when time is not allowed to put the ground through a regular rotation. I would only apply to the spade, where there is no more time allowed to procure good grass, than the same piece of ground would remain brown if top-dressed.

I have frequently urged different persons to try a part,—a half or a quarter of a lawn—that is, while they were top-dressing the one part, to dig up the other, and to judge for themselves the truth of my assertions. I recollect one instance, where I gave this advice to a gentleman who resides near Edinburgh. I was calling on business; and on gaining admission into his premises, I found, in front of a very pretty villa, situated in the best climate in Scotland, and where manure was to be found in any quantity, a lawn, covered over with lime, through which appeared the nap of a thick blanketing of coarse yellow moss. I could not help asking the gentleman why his lawn was in this state. 'Oh,' he replied, 'I have been advised to put on the lime to kill the moss, or fog as it is called; for, in truth, there is nothing grows on it but that abominable moss, and yellow dandelion, and I think of putting some earth on the top of the lime, and sowing some grass-seeds.' I volunteered my earnest counsel to try what digging up would produce on a part at least, gave him a recipe as to grass-seeds, and without a fee made my *conge*, the gentleman promised to follow my advice, which if he did, I felt assured would soon induce him to dig up the remaining part.

Perhaps grass might be produced at once, where the ground is not encumbered with trees, and all other circumstances are favourable, by

means of trench-ploughing—I mean by two ploughs following one another: the first would take as thin a slice as possible, which would be thrown into the open furrow; the next plough would follow on exactly the same ground, and bring up some fresh soil to the surface, which would be laid on the top of the first furrow. The ploughing being finished, a little short dung, such as is collected by the police, might be thrown on the surface, and harrowed in along with grass-seeds. In situations at a great distance from dung, bone-dust or pounded rape-cake could be used, to cause the braird of the grass to come away.

Having now broached this subject, I would not, for the present at least, pursue it any further, but ere I take my leave, I would remark in the first place, in corroboration of what I have been endeavouring to maintain, that by following the breaking-up system instead of the top-dressing one, I have not only altered the verdure, but I have increased the rent of the old grass-lawn on my farm at Balmuto, in Fifeshire, from three to five fold. In conclusion, I would make a brief recapitulation of my sentiments: I maintain, that except a few favoured spots, such as banks of rivers, &c., no ground can, without loss, be left long in pasture; that it appears to me, four or five years is, generally speaking, the longest period land should be allowed to lie in grass; that if pasture be the object, at the end of that time, the ground should be broken up, and returned to grass again. I maintain, that *without grass*, severely cropped land cannot be restored to full fertility; and *without cropping*, grass cannot be made to continue at the maximum point of verdure and utility. Lastly, I maintain, no land, under any circumstances, ought to be cut in hay, if intended to remain some years in pasture; and if cut as hay, every kind of land ought to be directly ploughed, and again put through the rotation."—*Quarterly Journal of Agriculture.*

GRASS SEEDS BEST ADAPTED FOR SOWING DOWN LAND.

BY MR. CHARLES LAWSON.

THE land kept in sown grass, whether for pasturage or forage, must always, in this country, form a considerable portion of the whole land in tillage; and a knowledge, therefore, of the proper kinds and quantities of seeds for sowing off such lands must be regarded as of some importance. But the subject is by no means generally understood. In various works and papers, indeed, the laying down of land to grass is treated of at large, but the kinds and quantities of seeds suited to different soils, and for different purposes, have not been distinctly pointed out; neither has a sufficient variety of soils and circumstances been attended to, so as to make them practically useful.

For a number of years my attention has been directed to this subject; and in furnishing grass-seeds for sowing land, I have been in the habit,

in the majority of cases, of making a selection of them myself. In most cases, too, I have examined the subsequent crops myself, or the general results have been communicated to me. By these means I have been enabled, from time to time, to observe the kinds and quantities of the mixtures suited to different soils and situations. The subject is one, indeed, upon which a great deal yet remains to be done, by careful and minute trials and comparisons. I am accordingly still prosecuting the subject. But, in the hope that the progress which I have already made in it may be of some utility, I present the results of my experience in the condensed form of tables, drawn up to suit a number of those circumstances in which the laying down of land to grass occurs.

It has been a very general practice to sow most of the grasses by measure, and the clovers by weight. But though it may appear to some a serious innovation upon the old-established practice, it would certainly be more correct to sow the whole *by weight*. For, although in grass seeds the greater weight of one variety is no criterion of its superiority over another variety of less weight, yet a greater weight in the same variety always denotes a superior quality. Thus when seed is light, and consequently inferior, the greatest number of seeds is obtained by adhering to a given weight, and hence there is the chance of nearly an equal number of plants springing up as when the seeds are plump and heavy.

But a given weight or measure of seeds does not indicate the relative number of plants that will spring up, because there is both a difference in the relative bulk and specific gravity of seeds, and there is also a difference in the number of seeds that grow from a given quantity,

These circumstances, therefore, have been kept in view in making up the tables, and it has been deemed useful, for the purpose of comparison, to give a table of the average weight of a bushel of each seed used.

Weight of the Seeds of Grasses and other Plants, per imperial bushel.

Agrostis stolonifera, ...	13 lb.	Festuca pratensis, ...	12½ lb.
vulgaris, ...	12	rubra, ...	10
Aira flexuosa, ...	6¼	sylvatica ...	10¼
Alopecurus geniculatus, ...	6	Lolium perenne, the varieties vary from	18 to 30
pratensis, ...	5¼	italicum, ...	16½
Anthoxanthum odoratum ...	6	Phleum pratense, ...	44
Avena flavescens	5	Poa annua	14
Briza media, ...	10¼	aquatica, ...	13¼
Cynosurus cristatus ...	26	fluitans, ...	14½
Dactylis glomerata, ...	11½	glauca	7½
Elymus arenarius, ...	9½	nemoralis, ...	13¾
Festuca duriuscula, ...	9½	pratensis, ...	13¼
heterophylla, ...	12½	trivialis, ...	15¼
loliacea, ...	15	Secale cereale, ...	62
ovina, ...	13¼		
tenuifolia, ...	13		

Clovers and other Plants.

Achillea Millefolium, ...	28¼ lb.	Trifolium minus, ...	64½
Hedysarum Onobrychis, ...	26	pratense, ...	62
Medicago lupulina, ...	63¾	Cow-grass, ...	62
Plantago lanceolata ...	51½	Trifolium procumbens,	64
Poterium Sanguisorba, ...	24½	repens, ...	65

Climate, altitude, and particular circumstances influencing the locality, produce marked differences on the vegetation of countries. But the sphere within which plants are cultivated in a single country such as Britain, is comparatively limited; and the pasture grasses have, it is conceived, a wider range of cultivation than the cereal grains. Where land is under the plough, therefore, and can produce the cereal grains and other cultivated plants, the natural grasses will grow with vigour. In elevated moors, and similar situations, indeed, the case is different, but the tables embrace such situations.

The herbage is influenced by the different kinds of soils, and especially with relation to their states of dryness or wetness. Soils have, therefore, as a convenient arrangement, and adapted to practical purposes, been classed under three divisions,—light, medium, and heavy. The light embrace soils more or less of a sandy and gravelly nature; the heavy soils embrace clays and heavy loams, and the medium soils are to be regarded as an intermediate class between these two extremes; —a light wet soil with respect to the grasses suited to it, approaching towards the heavy soils, and a dry heavy soil approaching towards the light soils.

The tables contain the weight of seeds to be sown per Scotch acre, as being conceived to be more convenient for Scotland; for, although the new weights and measures have been now a considerable period by law established, yet the old measure for land is held to be more convenient for the farmers of Scotland than the imperial. The imperial or English measure is to the Scotch nearly as five to four, that is, four Scotch acres are equal to five imperial or English acres. Where, therefore, the imperial measure is in practice, the tables can be readily converted into that measure by deducting one-fifth part.

QUANTITY OF GRASS SEEDS PER SCOTCH ACRE.

1. *For Alternate Husbandry.*

	For one year's Hay.	For one year's Hay and one year's Pasture.	For one year's Hay and two years' Pasture.
	lb.	lb.	lb.
Annual Ryegrass, ...	22	8	...
Perennial Ryegrass, ...	...	18	28
Phleum pratense, ...	...	3	2
Trifolium pratense, ...	10	5	2
repens, ...	2	5	6
Cow-grass, ...	..	..	2
Medicago lupulina, ...	..	2	2
	34	38	42

In heavy soils from 2 to 4lb. of Phleum pratense may be added for one year's grass.

2. *For Permanent Pasture.*

	Light Soil.		Medium Soil.		Heavy Soil.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
Perennial Ryegrass, ...	15lb.	30lb.	15lb.	30lb.	15lb.	30lb
Alopecurus pratensis ...	1½	3	2½	5	4	8
Dactylis glomerata, ...	6	10	4	7	3	5
Festuca pratensis, ...	3	5	3	5	3	5
Poa trivialis, ...		..	2	4	4	8
pratensis, ...	4	8	2	4	..	..
Phleum pratense, ...		..	2	3½	4	7
Trifolium repens, ...	6	10	6	10	6	10
pratense, ...	2	3	2	3	2	3
Cow-grass, ...	2	3	2	3	2	3
Medicago lupulina, ...	2	3	2	3	2	3
	41½	75	42½	77½	45	82

In certain cases, there may be added to either of the above Tables—

Achillea Millefolium, in dry soils, ½lb.

Hedysarum Onobrychis, in dry calcareous soils, 12lb.

Cichorium Intybus, in heavy soils, 2lb.

Apium petroselinum in lands where sheep are subject to rot, 1 to 2lb.

And if a crop of hay be taken the first year, add,

Lolium perenne (variety for single crops of hay) in light, medium, or heavy soils, with a crop 4lb.; without a crop 7lb.

Trifolium pratense, in light, medium, or heavy soils, with a crop 2lb.; without a crop 3lb.

3. *For Lawns, Bowling-greens, &c. kept constantly under the scythe.*

	Light Soil.		Medium Soil.		Heavy Soil.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
Pacey's Perennial Ryegrass,	12lb	20lb.	12lb.	20lb.	12lb.	20lb.
Alopecurus pratensis, ...	1	2	1	2	2	4
Anthoxanthum odoratum,	1	1½	1	1½	1	1½
Cynosurus cristatus, ...	2	4	4	8	4	8
Festuca pratensis, ...	1	2	2	4	2	4
ovina, ...	1	2	..	..	..	..
heterophylla, ...	1	2	..	..	..	..
duriuscula, ...	2	4	2	4	..	..
tenuifolia, ...	1	2	..	..	..	..
rubra, ...	1	2	2	4	2	4
Phleum pratense, ...	..	..	..	..	2	4
Poa pratensis, ...	4	8	2	4	..	..
trivialis, ...	..	..	2	4	4	8
glauca ...	1	2	..	..	..	..
nemoralis, ...	2	4	2	4	4	8
Trifolium repens, ...	6	9	6	9	8	12
	36	64½	36	64½	41	73½

6. *For Healthy and Moory Lands which have been Pared and Burned, or Scarified, for the purpose of producing herbage.*

These will rarely afford any thing more than a very cheap mixture of seeds, and the following are adapted for such situations :—

	With a Crop.	Without a Crop.
Mixed-hay seeds, ...	25lb.	40lb.
Rye (Secale cereale), ...	..	45
Trifolium repens, ...	6	9
	31lb.	94lb.

Where the land of this description is of a high altitude, as 500 feet and upwards above the level of the sea, the following, being particularly adapted for mountain pastures, may be added as a portion of the hay seeds,—

Festuca ovina, ...	2lb.
duriuscula, ...	2
heterophylla, ...	2
Poa glauca, ...	2
	8lb.

7. *For Improved deep Mossy grounds intended to lie in grass.*

	With a Crop.	Without a Crop.
Perennial Ryegrass, ...	10lb.	18lb.
Phleum pratense, ...	8	12
Trifolium repens, ...	8	12
Agrostis stolonifera, ...	2	3
Alopecurus pratensis, ...	2	3
	30lb.	48lb.

4. *For Land in Preparation for Irrigation.*

	Light Soil.		Medium Soil.		Heavy Soil.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
	lb.	lb.	lb.	lb.	lb.	lb.
Perennial Ryegrass, ...	10	18	7	12	7	12
Agrostis stolonifera, ...	2	4	2	4	3	6
Alopecurus pratensis, ...	2	4	3	6	4	8
Festuca pratensis, ...	2	4	2	4	2	4
loliacea, ...	4	7	4	7	4	7
Poa trivialis, ...	2	4	2	4	3	6
fluitans, ...	1	2	2	4	2	4
Phleum pratense, ...	4	6	6	9	7	10
	27	49	28	50	32	57

These tables, embracing the principal classes of cases for sowing

land, might have been extended so as to suit numerous other circumstances which must frequently present themselves. But the general principles laid down have been deemed sufficient for the extent to which this paper was necessarily circumscribed, and because judgment and discrimination must, in many cases, be exercised, both regarding the kinds and the quantities of the seeds to be sown. Thus it may be expedient, in particular cases, to withdraw certain grasses and to substitute others; and this is especially to be kept in view where lands have a tendency to produce, naturally, any particular grass, which, though good in small quantity, is, in itself, but secondary with reference to the special object in view.—*Quarterly Journal of Agriculture.*

BLIGHT.

The true blight or Aphis is a quiet, dull, stupid-looking insect, mostly without wings, but sometimes it has four, two of which are much larger and longer than the other two, and fold over and hide them, reaching beyond the body, and meet together behind it. These wings are generally as clear as crystal, with a few veins in them, yet if you hold the insect in the sunshine, and examine him through a glass, you will find they take all the colours of the rainbow: you will also find he has a long trunk or sucker, which is used as a pump or syphon, through which the sap of plants is drawn. I have sometimes seen this sucker so long as to pass under the breast and legs, and reach a considerable distance behind the body, but it is not generally so. All blights infest the young and juicy shoots and leaves of plants, for the purpose of sap-sucking: and the plants honoured by their operations forthwith play the most amusing and incredible vagaries: bearing blossoms instead of leaves, leaves instead of blossoms: twisting into corkscrew stems which ought to be straight, and making straight as sticks those which, like the scarlet runner and hop, ought to twine; as in the peach, making the leaves hump up in the middle, and causing the tree to look as though it had a famous crop of young fruit; making apple trees bear blossoms on their roots, and causing roots to grow out of their young shoots; and, by tormenting orchards in this way, prevent the fruit from ripening, and make it woolly, tasteless, and without juice. Our China asters often owe a good deal of their beauty to these vermin; they act as a spur to make them blossom beyond their strength and nature, and then die off without bearing seed. It is amusing to see with what regularity the blight station themselves on the young shoots of the Guelder-rose, crowding so close together that not a morsel of the rind is to be seen, and not unfrequently forming a double tier, or two thicknesses; the poor sprig losing its former unbending upright position, and writhing itself into strange contortions.

"Blights are of all colours, but green is their most fashionable hue; those of broad beans are black as soot, and velvety; and these, if attended to, do but little harm; they cluster at the very top, and each

bean should be lopped just below the blight, and the top carried away and burnt, not thrown on the ground, or else they are sure to climb up the bean stalks again, and, stopping here and there at the best landing place, to increase and multiply, thus soon covering the whole plant; nor should they be buried in the ground, for they take care to outwit you by living under ground for months, and, when the gardener's spade turns them up again, they make for the beans directly: the plan of lopping the beans does not injure the crop, but, if carefully done, rather improves it. The blight of the willow is very large, and, at first sight looks greyish, but under a glass is beautifully variegated with black and white: when crushed it gives out a deep blood-coloured die, which stays on your hands several days, in spite of frequent washings.

I have taken a good deal of pains to find out the birth and parentage of true blights; and for this purpose have watched, day after day, the colonies of them in my own garden, and single ones which I have kept in-doors, and under tumblers turned upside down. The increase is prodigious; it beats every thing of the kind that I have ever seen, heard, or read of. Insects in general come from an egg: then turn to a caterpillar, which does nothing but eat; then to a chrysalis, which does nothing but sleep; then to a perfect beetle or fly, which does nothing but increase its kind. But blights proceed altogether on another system; the young ones are born exactly like the old ones, but less; they stick their beaks through the rind, and begin drawing sap when only a day old, and go on quietly sucking away for seven or eight days; and then, without love, courtship, or matrimony, each individual begins bringing forth young ones, and continues to do so for months, at the rate of from a dozen to eighteen every day, and yet continues to increase in size all the while: there seem to be no males, no drones, all bring forth alike. Early in the year these blights are scattered along the stems, but as soon as the little ones come to light, and commence sap-sucking close to their mother, the spaces get filled up, the old ones look like giants among the rest, as here and there an ox in a flock of sheep; when all the spare room is filled up, and the stalk completely covered. The young ones, when they make their first appearance in the world, seem rather posed as to what to be at, and stand quietly on the backs of the others for an hour or so: then, as if having made up their minds, they toddle upwards, walking on the backs of the whole flock till they arrive at the upper end, and then settle themselves quietly down, as close as possible to the outermost of their friends, and then commence sap-sucking like the rest; the flock by this means extends in length every day, and at last the growing shoot is overtaken by their multitude, and completely covered to the very tip. Towards autumn, however, the blights undergo a change in their nature: their feet stick close to the rind, their skin opens along the back, and a winged blight comes out—the summer generations are entirely wingless. These are male and female, and fly about and enjoy themselves; and, what seems scarcely credible, these winged females lay eggs, having first lived through the winter; and,

whilst this operation is going on, a solitary winged blight may be observed on the under sides of the leaves, or on the young shoots, particularly on the hop, and differing from all its own progeny, in being winged and nearly black, whereas its young are green and without wings. In May, a fly lays a lot of eggs; these eggs hatch and become blights; these blights are viviparous, and that without the usual union of sexes, and so are their children and grandchildren, the number of births depending solely on the quantity and quality of their food; at last, as winter approaches, the whole generation, or series of generations, assume wings, which the parents did not possess, undergo frequently a total change in colour, and in the spring, instead of being viviparous, lay eggs.

You will never find a plant of any kind infested with the aphis, without also observing a number of ants and ladybirds among them, and also a queer-looking insect, like a fat lizard, which is in fact the caterpillar of the ladybird. The connexion of the ant and the aphis is of the most peaceful kind that can be conceived; their object is the honeydew which the aphis emits; and, far from hurting the animal which affords them this pleasant food, they show it the greatest possible attention and kindness, licking it all over with their tongues, and fondling it, and patting it, and caressing it with their antennæ in the kindest, prettiest way imaginable. Not so the ladybird, or its lizard-like caterpillar: these feed on the blights most voraciously, a single grub clearing a leaf, on which were forty or more, in the course of a day. The perfect ladybird is a decided enemy to them, but not so formidable a one as the grub. The eggs of the ladybird may often be seen on the hop leaf; they are yellow, and five or six in a cluster placed on their ends: these should on no account be destroyed, as is too often the case; but, on the contrary, every encouragement should be given to so decided a friend to the hop-grower.

Besides the ladybird and its grub, there are two other terrible enemies to the poor aphis; one of which is a green ungainly-looking grub, without legs, which lies flat on the surface of the leaf, and stretches out its neck just like a leech, till it touches one of them; directly he feels one he seizes it in his teeth, and holds it up wriggling in the air, till he has sucked all the goodness out of it, and left it a mere empty skin. This curious creature turns to a fly (one of the Sylphidæ), which has a body banded with different colours, and which in summer you may often observe under trees and about flowers, standing quite still in the air, as though asleep, yet, if you try to catch him, darting off like an arrow. The other has six legs, and very large strong curved jaws, and is a most ferocious-looking fellow, strutting about with the wings of the blights which he has killed on his back. This fierce fellow comes to a very beautiful fly (Chrysòpa Pêria), with four wings, all divided into meshes like a net, and two beautiful golden eyes. All these creatures, which thus live on the plant lice, have a very strong and disagreeable smell in the perfect state.

For a favourite plant infested with blight there are several reme-

dies—smoke of tobacco, snuff, &c.; but the most effectual, and the least hurtful to the plant, is to let it stand in a tank of cold water for half an hour, when all the blights will leave it, and swim on the surface of the water.—*Entomological Magazine.*

AN IMPROVED PLAN OF SOILING.

COMMUNICATED BY MR. J. JENNER.

MR. JOHN GEDNEY, of Redenhall, Norfolk, a considerable grazier, never ties his beasts up, nor suffers them to range in the yards at the time of soiling, but forms pens about five yards square, in which two beasts are put, each square containing two troughs for the food. He is of opinion, when they are tied up they are too much confined, and frequently kept too warm, and when running loose in a yard they have too much liberty, and the master bullock will generally drive the others from the food; but when confined in pens, in sheds which are quite open on one side, they are not exposed to the weather and are kept sufficiently warm, and they have sufficient room to move about, which tends much to their thriving. He has tried them tied up, and running loose in yards, and the above plan. He is quite certain they will not thrive so well any way as by the plan he has now adopted. Another advantage is, he considers the manure is much more valuable when collected under cover and not exposed to atmospheric influences. The manure when taken from the sheds, is laid in small ridges, and covered carefully over with mould to prevent the rain washing it, and also to prevent its heating. Four or five days before he carries it on the land it is well turned and mixed together, and when in a high state of fermentation, it is carried on the land and ploughed in immediately.

MANUFACTURE OF SALT FOR DAIRY PURPOSES.

The Dutch are remarkably particular as to the proper quantity and quality of their salt, of which there are three kinds manufactured. The small salt for butter, which is somewhat smaller than the common salt made in this country, is boiled or evaporated in twenty-four hours. This kind is also used, as already mentioned, in mixing in some districts with the Kanter cheese. The second salt is evaporated by a slower process, in about three days; it is used in salting, by outward application, the Edam, Gouda, and in some places the Kanter cheeses. This kind is beautifully formed in the natural crystals of about half an inch square. The third kind is larger sized: the crystals are nearly an inch square, and the evaporation process lasts four or five days. It is sometimes used for salting the cheeses by outward application, but principally for curing fish, beef, pork, &c. The Dutch pay great attention to the exact quantity of the particular kind of salt necessary, so that we never find the cheeses made in Holland salted to an intolerable degree, as we sometimes experience in this country. I (says Mr.

Mitchell) endeavoured to discover the mode of manufacture, and learned some particulars on this important subject; but there appeared to be some secret in the process which the manufacturers were unwilling to disclose. One thing is certain, that the use of the Dutch salt is one of the causes of the sweet and delicious flavour of their butter, which, although always well flavoured, hardly tastes of salt, or rather of that acrid quality which the poisonous bittern or the muriate and sulphate of magnesia pervading our common salt, imparts to our butter; and this is very obvious in comparing the Dutch butter with the best salted butter of this country. When it is considered that the health and prosperity of the people are materially concerned in the use of this article in so many various ways, the propriety, or rather necessity, of improvement in its manufacture will be the more evident; and it is rather remarkable, that while chemistry has now advanced to so much perfection, no change has taken place in the mode of making salt for several centuries. The late scientific Earl of Dundonald, the late Dr. Coventry, and the Rev. James Headrick, proposed important improvements in the mode of manufacture of this article, which, however, seem never to have been adopted.

ON THE FATTENING OF CALVES.

The *feeding of Calves* for veal, is a branch of rural industry, that has not yet been duly attended to; though it seems capable of yielding a profitable return, and might be greatly extended and improved. In pastoral districts where the greatest number of calves are reared, milk could not be spared to fatten them to the highest pitch; and they are generally too far from market. In the dairy districts, nearly all the bull calves, and many of those of the other species, are slaughtered when young; and most of them when only a day or two old. This is certainly bad economy; for, as the flesh of a calf that has scarcely ever tasted food, is neither palatable nor wholesome, and as milk cannot be turned to more profitable account than in feeding calves till they are from four to six weeks old, it must be bad management to kill any of them, when only a few days old. Veal, when moderately fat, is an excellent species of animal food, and can be brought to market, with greater profit, than either beef or mutton. The feeding of calves is a simple and easy process; and as the milk of a cow should not be used as human food till a week after she has calved, and as milk cannot be more profitably used than in feeding calves for a few weeks, it betrays great ignorance and want of economy to kill any of them, till they are fed on the milk of their dams for at least four weeks. This is generally done in France, Belgium, and Holland, and no person in these countries will taste the milk of a cow, till about a week after she has dropped her calf.

The art of fattening calves for the butcher, though much neglected in many parts of Britain, has long been carried on to considerable

advantage in the parish of Strathaven, and in some of the neighbouring parishes on the western side of the county of Lanark. Strathaven veal has, like Dunlop cheese, and Lochfine herrings, obtained much eclat in the Glasgow and Edinburgh markets. I shall therefore mention some instances of the weight to which calves have been fed in the Strathaven district, the prices they have fetched, and the manner in which the calves are fattened.

Mr. Thomas Hamilton of Greathill, near Strathaven, fed a calf in 1765 to such a weight, that he received L. 5 for it from a butcher, at a time when fresh butter was sold at 3d. per lb. avoirdupois, and when neither beef nor mutton sold higher. As the price of veal has often been as high as 1s. 4d. per lb. of 22½ oz., a calf of the same weight and fatness as that of Mr Hamilton's would have brought more than three times the price at which it was sold. James Alston, Esq. of Muirburn, fed a calf in 1798 to the weight of 16 stones, of 16 lb. to the stone, and 22½ oz. per lb., of saleable veal in the four quarters. This calf was sold to a butcher for something above £10; but at the price of veal some years after, it would have sold in the market at L. 17, besides 30s. or more for hide, intestines, &c. James Granger, Esq. of Netherfield, Thomas White, Esq. of Tweediehall, and William Young of Newton, all near Strathaven, fed each of them calves between 1793 and 1796, that were bought by butchers, the lowest of them at L. 10, when veal sold at about 8d. per lb., and all these calves would have given almost double these prices, when veal sold about 1810 and 1814 at 1s. 4d. per lb. the same weight. Mr. William Strang of Shawton, near Strathaven, fed in 1815 a calf to the weight of 35 stones English, of gross living weight. Had this calf been killed at the time, it would have weighed nearly 20 stones county weight of veal in the four quarters. Mr. Strang was offered 14s. per stone for the four quarters; and the hide, head, and intestines would have brought about L. 2 more. At the price of veal of some of the preceding years, this calf would have brought in the shambles nearly L. 23. Mr. William Granger in Dykehead, near Strathaven, fed a calf in 1819 to the weight of 22 stones county weight of saleable veal in the four quarters. This at 10d. per pound, the price that year, could have been sold in the market at L. 15, 1s., besides hide, &c.; and at the prices of former years, this calf would have brought in the market L. 25 or more in retail.

Many other instances might be pointed out, of calves being fed to nearly the weight above mentioned, and of being sold to butchers at upwards of L. 10, notwithstanding the great fall in the prices of all sorts of butcher-meat since the termination of the late war; but these may serve to shew what has been done in the western part of Lanarkshire; and of course what might be done in any other part of Britain, where cows of a similar weight and quality to those in the dairy district of Scotland are kept and properly managed.

It is right to mention, however, that feeding calves to the weights and degree of fatness that have been mentioned, proceeded more from ostentation than prudence. A calf that is rightly fed, till it is from

four to six weeks old, will, if thriving, and prices fair, sell now at from L. 3 to L. 4, and would have sold much higher about twenty years ago. But when brought to that condition, it cannot be fattened or much enlarged in size, with the same chance of profit, on the milk bestowed upon it, as at first; and it would be better to apply the milk to the feeding of one young calf after another, than to attempt to force on one that has been brought to the state of marketable veal, into any farther condition of fatness or weight. That can only be done at a sacrifice of milk beyond its value.

From what I have seen of the London fleshmarkets, I am confident that the feeding of calves is not so well managed in England, as it is in the district near to Strathaven. In the accounts given by Dr. Dickson and others, it appears that young calves are bought, in the vicinity of London, at from 20s. to 30s. and fed till they bring from L. 4 or L. 5, to L. 7 or L. 8; and the Doctor says, that 'the business of suckling calves was formerly reckoned to turn to good advantage, when each calf, through the time of its fattening, brought a profit to the farmer, of *three shillings a week.*' But he adds, that profit on that branch of industry had been much increased at the time he wrote. It appears, however, from what has been stated, that a much greater return is generally obtained in Scotland, when the fattening is continued and well conducted for five or six weeks. And the superior profit in Scotland to that near London may probably arise, in part, from the improved dairy breed of cattle; but chiefly from the superior mode of feeding there, of which a correct account falls to be given, that all others may follow the same course in fattening calves. Mr. Holland, in his Survey of Cheshire, says, that in a dairy of twenty cows, the first ten dropped calves will, when suckled about six weeks, bring from 20s. to 25s. each, and the rest from 8s. to 12s. These miserable prices, where the soil and climate are superior to what they are in Scotland, and where the cows are about the same size as they are in Lanarkshire, and in a country so populous as Cheshire, and only the breadth of the river Irwell from Liverpool, and a short distance from other populous towns, where butcher-meat is more in demand than it is in Scotland, prove to a demonstration, that the mode of feeding calves in Scotland is far superior to that in any part of England. Any active dairy farmer in the western ranges of Lanarkshire, would have considered himself and his wife affronted, if they had not raised the price of a thriving calf, fed entirely on its mother's milk, 10s. every week, for five or six weeks; and even yet, when the price of veal is lower than formerly, they reckon on advancing the price of a good calf 7s. or 8s. per week for that period.

In the Scottish dairy districts, every thing respecting the cows and their milk, is managed by the farmers' wives and their daughters, or by female servants that are bred to that branch of industry, and act under the immediate direction of their mistresses. But the reporter of the county of Middlesex says, the farmers' wives and daughters in that county, have neither industry, inclination, nor skill, in the manage-

ment of the dairy. Even their female servants will not enter a cow-house, or milk the cows. All that sort of labour is performed by men.

The mode of feeding calves, as practiced in the vicinity of Strathaven, is so easy and natural, that it might be put in practice in any part of Britain or Ireland with success. The calves are fed on milk only, with seldom any admixture; and they are not permitted to suck their dams, but are taught to drink their milk from a dish. In Galloway, and some other parts of Scotland, the cows were allowed to suckle the calves, and the dairy-maid struggled with the animals for such portions of the milk as she could secure; and that mode is not yet altogether abandoned. And as arguments are advanced for even the worst of practices, those who allow their calves to suck, say, that by so doing, a much greater portion of saliva is secreted, and carried with the milk into the stomach of the calf, where it promotes digestion, and accelerates the growth and fattening of the young animal. But although saliva is necessary to digestion, it can be drawn forth by placing an artificial teat in the mouth of the calf while feeding, and preventing the animal from drinking its milk too hastily, or giving it too cold. In the dairy districts of Scotland, the dairy-maid puts one of her fingers into the calves' mouths when they are feeding, and this, or any thing similar, serves the same purpose as the natural teat, in promoting the necessary secretion of saliva. A piece of clean leather, about three inches long, and fixed to the bottom of the dish, will, when the milk is given slowly, so that the saliva may be drawn from the glands of the calf, and conveyed to the stomach with the milk, answer every purpose that sucking can serve, and still more of the saliva may be conveyed to the stomach of the calves. When they are not feeding, a lump of chalk is often laid within their reach, by licking which they are induced to swallow much saliva that would otherwise drop from their mouth and be lost. Calves frequently suck or chew any thing within their reach, not for food, but to help them to swallow saliva, and on that account, something like a teat should be placed near them, that by sucking it they may promote the secretion of saliva, and convey it to the stomach.

But though sucking its dam may be favourable to the calf, yet it seriously injures the cow. The calf cannot, when young, consume all the milk of a good cow, and she becomes so fond of her calf, that she will not yield her milk to the dairy-maid; and unless the cow's udder is completely emptied of milk every time she is milked, the lactic secretion is gradually diminished, and the cow will ultimately run dry on that account. But when the milk is drawn from the cows, and given by hand to the calves, every thing can be regulated correctly to the advantage of the cow, the calf, and the owner of both. And when calves are reared for stock, various substitutes for milk can be gradually introduced, and the milk slowly withdrawn, without injuring the stomach of the calf by a too sudden change of food. And when calves are to be highly fed, the milk of two cows can be given them by hand feeding, while cows will suckle none but their own calves.

Some people in the Strathaven district have given their calves milk sparingly at first, to render their appetite keen, and prevent them from loathing their food; while others give them a plentiful supply from first to last, but taking care never to allow them to surfeit their stomachs. Where calves are fed to a high degree, the young ones get the first drawn milk, called "*forebroads*" in dairy language, and which abounds with more serum than the last drawn milk, which they call "afterings;" and as the calves advance in age and fatness, they get less of the "forebroads," and more of the "afterings," frequently that of two or three cows.

Some have mixed eggs, and others have put meal into calves milk; but the most skilful feeders give no admixture whatever, but fatten the calves on milk alone. The whole secret of fattening calves for veal is to give them, after they are three or four weeks old, abundance of milk, keep plenty of dry litter under them in their stalls, let them have the benefit of good air, moderate warmth, and be nearly in the dark, as they hurt themselves with sportiveness when exposed to much light. In Holland, the best feeders keep the calves in wooden pens or coops, in which they can stand or lie at pleasure, but cannot turn themselves round. I am not sure that such rigid confinement is beneficial. It is necessary, however, to keep fat calves in places where they have but little light. They require to be fed twice every twenty-four hours.—*Journal of Agriculture.*

ON SECURING OF CORN RICKS FROM THE DEPREDATION OF RATS AND MICE.

COMMUNICATED BY MR. JOHN JENNER.

The following has been recommended as a cheap and effectual expedient to prevent rats and mice from getting into corn ricks. The rick should be built nearly perpendicular, and cut round about two feet high from the ground, slanting from the top towards the bottom about 18 inches. The part that is cut is plastered over with mortar made of clay, or any other substance that will stick to the ends of the straw, leaving a rim at the top of about two inches, the whole is then whitewashed. This plan is adopted by many farmers in Norfolk, and those who practice it never have their corn injured by rats or mice.

THE TURNIP-FLY.

The turnip-fly is not always of one kind, but the difference in them is not very important, for they only alter in their paint, their build is always alike. The most common is bottle-green, but in some fields are all painted black, with a white line on each side from stem to stern down the neck. They are so active, that the only way in which I could ever obtain them, in newly-sown fields, was by sweeping the surface with a gauze net, on an iron hoop at the end of a strongish stick. They jump like fleas as soon as they see you. This insect, or rather its grub, commences its attack on the turnip as soon as it is up, devouring

the two cotyledons and the little heart, and sometimes in a few days leaving the field as brown as it was on the day it was sown. Schemes without number have been tried to get rid of or kill this little pest wherever it has appeared. I have always observed the greatest quantity of grubs on very young plants; they a:e very various in size, and it is not before the plants are a fortnight or three weeks old, that the beetles appear in any quantities. Yet there are some beetles observed at the first coming up of the plants.

Now I know from experience, that the turnip-fly feeds on wild mustard, and several other hedge plants, and therefore it is not improbable, that when they smell the fragrance of the fresh bursting cotyledons of their favourite food, they would skip down from their spring habitations, the hedges, and make the attack. I first sowed some seed in a flower-pot, with earth out of my own garden; it produced the animal in abundance. Secondly, I enclosed the pot with pasteboard and canvass, with the same success; but still there was a possibility of the enemy getting in, as I had not the cover sufficiently close. Thirdly, I made a light frame about eight inches square, covering it with very fine silk gauze, carefully stopping the crevices of the door with pasted paper, and round the pot where the cover was fastened on with putty, so that there was no possibility of any thing coming to it from without. Yet this experiment was attended with the same success; except that one point, a negative point, was now proved, namely, that the fly did not come to the turnip from other plants, and this was a point gained. Fourthly, I baked the earth in a cast-iron pot over the fire, and used no other water to water the seed but such as I had boiled myself, applying it at the bottom of the pot with a common feeder. Then I exercised the same care, and took the same precautions as before. I did not take off the cover till the plants were of a considerable size, and I found them all a-hop with beetles. I had now made another step; having before found that the beetles did not come from other plants, it was now clear that it was not in the earth nor the water. Fifthly, with a lens I examined the seed, and found on it a number of white flattish substances; some of the seeds were without any, but there were generally one, two, three, four, and in one instance five on a single seed. These I concluded were eggs, and I thought the only way left me was to attack them. It would have been easy enough to poke them off with a needle, but I could not see how I was to employ a needle and a magnifying glass on a sack of turnip seeds. I therefore made some pretty strong brine, and soaked the seed in it for twenty-four hours, then dried it thoroughly, and with all the precautions which I have mentioned, I sowed it again, and there was not a single fly, neither was there a single turnip injured. I tried again and again, and I found that without weakening the brine, if the seeds were only kept in it three hours, there were no beetles, but yet the seed came up as well as ever. I now practise this method with turnip-seed, cabbage-seed, and in fact with all the cruciform plants in common cultivation, with very satisfactory success. The whole of these experiments were made on the Swedish

turnip, which is generally more infested by these beetles than any of the other sorts.—*Entomological Magazine.*

[We some time ago mentioned, in regard to avoiding the attacks of the turnip-fly, that a farmer completely succeeded in avoiding them for many years, by rubbing, keeping, and sowing his turnip-seed among flour of sulphur. Since the turnip insect is attached to the turnip-seed, it is clear that the sulphur must have destroyed them. This attachment of the nidus of the insect to the seed is a very remarkable circumstance, and requires farther investigation than the experiments above related, to establish the fact as a general one.—*Editor, Q. J. A.*]

In addition to the preceding remarks on the Turnip-Fly, we subjoin the following interesting particulars from a pamphlet published by the Doncaster Agricultural Society.

We have found that the Turnip-fly is not altogether the creature of a few weeks, nor the inhabitant alone of the turnip field, where only it is dreaded:—that it not only lives through the summer, but survives the winter too, and waits only for the return of vegetation to return to its activity.—that it continues in all fields, whether pasture or cropped, where weeds can be found to feed it:—and that it only waits for the fragrance of the young turnip plant to leave every other vegetable, and commence its attack:—that all rough grounds, and sheltered dry retreats, form a covert for it through the winter, and every tree is a hiding place for the enemy: we have found too, that, however, the process of preparation for turnips may accelerate the birth of the insect on the turnip field, the fly is not dependant on any such process, but is brought into being in abundance, independently of all cultivation. The farmer, knowing this, must therefore be on the alert against an enemy at hand, and increasing in a thousand ways around him. He will not be so much concerned in experiments for preventing the generation of the fly, seeing that, in the present state of our information, it is almost out of his power to attempt it; but he will prepare against its ravages by such expedients as practical trial shall prove to him to be the most efficacious, even should they not be in all cases, and under all circumstances, completely successful.

The following few practical directions are drawn from the information obtained by the Committee:—

1. That, most effectually to insure the speedy growth of the plant, the land should be kept in the best possible state of cultivation.

2. That scuffling or ploughing the land before winter, and clearing the hedge bottoms, and every other place which can harbour the insect, should be systematically attended to.

3. That the fallow should be completed as early as possible, so as to give an opportunity for choosing a favourable season for sowing.

4. That the system of ridging the land, with manure under the rows, and drilling on the ridge, be in every possible case adopted.

5. That the most favourable opportunity for ridging be chosen; particularly that the land be not ridged in too dry a state.

6. That as soon as the land be opened for the manure, it be laid in —the ridges formed, and the seed drilled immediately. The quicker these operations follow each other, the better chance of the crop.

7. That the manure chosen be such as will be adapted to the soil, and ensure the speediest growth of the young plant, and that a full quantity be allowed.

8. That the seed be not deposited in the manure, but the manure be thinly covered with soil, and the seed drilled in this soil.

9. That a very liberal allowance of seed be given, as much as three or four pounds per acre, for drill, and six or seven for broad cast, and that this seed be of one year's growth.

10. That as soon as the plant appears above ground, it be dusted with quick lime, and this repeated as often as rain or wind beats it off and the fly re-appears.

11. That in places which suit, and in seasons particularly dry, watering by a watering machine be resorted to.

Under these precautions, the Committee confidently trust, that the loss of crop from the turnip-fly may be, in most cases, prevented."

ON THE CAUSE OF FAILURE OF THE POTATO CROP.

BY MR. NIVEN.

The Potato, "solanum tuberosum" of Linnæus; belonging to the natural order Solaneæ, is a native of South America. It is supposed to have been introduced into Ireland by Sir Walter Raleigh, about the end of the sixteenth century.

The Potato is a bulb, or tuber, containing perhaps the greatest quantity of nutritive matter of any other root of the same size; it is consequently of great value as an article of food, both for man and beast. It contains, according to chemical analysis, from one-fifth to one-seventh of its weight of starch, with smaller proportions of fibre, mucilage, and albumen. The parenchyma of this root consists, according to the analysis of M. F. Marcet, in 100 parts.

$$\left.\begin{array}{lr} \text{Of Carbon,} \ .. & 37.4 \\ \text{Oxygen,} \ .. & 58.6 \\ \text{Hydrogen,} & 4.0 \end{array}\right\} 100.$$

For many years this inestimable root has become one of the staple productions of the soil of Great Britain, and unquestionably is one of the most useful plants in the wide range of the vegetable kingdom.*

The treatment and culture of this valuable root become then, under any circumstances, a subject of much importance: but more especially so, in the midst of such alarming failures as those alluded to, under the head of this Essay.

* Previous to entering on the discussion of this important subject, it may be well to premise, that I shall endeavour, as much as possible, to avoid the use of scientific terms, where they can be more simply explained; humbly conceiving that such description will best suit the *practical* object in view.

In considering the subject of the failure of the Potato, amidst such a variety of conflicting opinions, arising from the difficulties and mystery under which the matter appeared to be involved, I was led to institute a course of experiments in order to ascertain what might be the most certain and safe method of culture, under existing circumstances.

Before entering on the subject matter of the experiments, I consider that it may be proper to enumerate here, some of the principal assigned causes for the failure of the Potato.

First.—It has been asserted, that the soil in Ireland, having been so much cultivated with the Potato, has, in consequence of certain noxious matter thrown off by the plant, become unfavourable to the growth of that root. This cannot hold good however in all cases, even although the given cause were true, as much of the soil in Ireland has not been cultivated with Potatoes; and even admitting the exception, it will immediately be shown that failure has taken place, even in this case.

Second.—That the Potato had become infected with a minute fungus, or parasitical plant, destructive of the principle of vegetation in the bulb. This, in my opinion, would appear to be more the *consequence*, than the *cause* of disease, or putrefaction in the root.

Third.—That the failure of the Potato arises from the *effects of sea water*, and fermentation in the ship; this, of course, could only apply in cases of *imported* seed.

Fourth.—That much of the failure had taken place from the Potato having been planted in *dry, hot* weather, (of which we have had so much during the planting season of late years,) especially where the soil had been very dry, previous to, and at the time of planting; and the manure, from its own nature and the state of the weather, more or less *overheated*.

That this may have contributed in some cases to the partial failure, I do not doubt; but on the other hand, I may enquire, what then becomes of the failures that have taken place *so generally*, in that variety of the Potato commonly called the "White Bangor," so extensively cultivated for the *early* supply of the Dublin Market, and generally planted at a time when both the *soil* and manure are *cool* and *moist*.

Viewing all these together, it appears that another cause, or causes, must be sought for, to account for the failure of the Potato.

Conceiving how important it would be, under such a variety of opinions, to set aside, by a direct course of experiment, as many as possible of the supposed causes of the failure, and so to clear the way for further investigation, I adopted the following plan:

In the spring of 1834, I selected a piece of ground, that had not been cultivated with the Potato at any former period, at least as far as I could ascertain. It was subdivided into nine different compartments, each containing two hundred and sixty square yards.

Finding the "*Pink Eye*" most generally complained of as subject to failure, I selected that variety of the Potato for the test of experiment. They were taken from a ship at the Dublin quays, direct from Scotland, and appeared to be of the best quality.

For each of the subdivisions alluded to, two hundred weight of the seed Potatoes were prepared and planted, with the same quality and quantity of manure, throughout.

The planting was done during the latter end of the month of April. The weather being very *dry*, with hot sunshine; thermometer ranging from 50° to 55° Fahrenheit.

The soil a *dry* gravelly loam, the subsoil a *limestone* gravel.

The following Table exhibits the arrangement of the Planting.

Label.	Weight of Seed.	Description of the Seed.	Distance planted.
1	2 cwt.	The large whole Potato.	About 3 feet apart.
2	2 cwt.	Do. with all the eyes picked out but the end eyes.	About 18 inches apart.
3	2 cwt.	Ditto, cut across the bottom cuts.	Ditto.
4	2 cwt.	Ditto, cut lengthways.	Ditto.
5	2 cwt.	Ditto, cut across the rose ends.*	Ditto.
6	2 cwt.	Potato cut into sets. The bottom sets	About 8 inches apart.
7	2 cwt.	Do. do. The rose or end sets	Ditto.
8	2 cwt.	Do. do. The middle sets	Ditto.
9	2 cwt.	The middle sized whole Potato	About 20 inches apart.

As it occurred to me, that the failure of the Potato might to a considerable extent, arise from the circumstance of being cut, I thought it advisable to plant the divisions No. 1 and 9 with the Potato entire; judging, that the comparison between them and the included divisions of the cut Potato, would prove the correctness of this opinion, or not.

It also appeared to me a matter of importance, to ascertain fully, whether the same weight of the Potato planted whole, would yield as much produce as the same weight cut into sets, in the usual way, on the same surface of ground.

I shall now proceed to give an exact statement of the various results of the different experiments, numbered in the foregoing table.

* The term "Rose end," is usually applied to that portion of the potato containing the greatest number of eyes.

By the end of May the following Observations of the respective Experiments were taken.*

Division.	*Appearance above ground.*	*Proportion of Failure.*
1	Regular, strong, and vigorous.	No failure.
2	Very irregular.	Failure about one-third.
3	Very irregular.	Failure about two-thirds.
4	Very irregular.	Failure about one-third.
5	Irregular	Failure about one-fifth.
6	Irregular.	Failure about one-eighth.
7	Irregular.	Failure about one-half.
8	Very irregular.	Failure about one-half.
9	Regular and vigorous.	Scarcely a blank.

Viewing all these experiments together, as they broke the ground, or came up, it was remarkable to observe the beauty and regularity of the divisions No. 1 and 9, and the rapidity with which they advanced, in comparison with the others.

By the end of September I was somewhat surprised to find the divisions of the whole Potato planting, exhibiting symptoms of ripeness, by the change in the colour of the tops, whilst all the others were quite green, and some only in flower. This was the more remarkable, as the division No. 9, was the last planted by nearly twelve days; this, and No. 1, however, had nearly the same appearance, and were *ripe* fully a fortnight before the others.

By the end of October the crop was dug up, and the produce of each experiment or division carefully *weighed*, keeping the *large* (or *useful* size) and the *small* separate.

* It is not upon these experiments *alone* that I propose to draw my conclusions, but from a variety of information collected on the subject in Scotland, England, and Ireland.

The following Table exhibits the result of the produce.

Label.	*Description of the Seed.*	*Produce, Large and Small separate.*			*Whole produce.*		*Per Irish Acre* nearly	*Per English Acre* nearly	*Quality.*
			cwt.	st.	cwt.	st.	Tons.	Tons.	
1	The large *whole* Potato.	Large Small	13 1	6	14	6	22	14	Tubers very large and coarse.
2	Ditto with all the eyes picked out but the end eyes.	Large Small	8	7 2½	9	2½	14	9	Tubers very large and of bad quality.
3	Do. cut across the bottom cuts.	Large Small	6	4 2½	6	6½	10	6	Tubers large and of bad quality.
4	Do. cut lengthways	Large Small	10	3	10	3	15	10	Tubers large and of bad quality.
5	Do. cut across *rose ends.*	Large Small	14	7 3	14	7	22¼	14½	Tubers not so large and of *good* quality.
6	Potato cut, cut sets the bottom cuts.	Large Small	12	7 2	13	1	19½	13	Tubers large and of bad quality.
7	Do. The *rose cuts.*	Large Small	13 1	6½ ½	14	7	22¼	14½	Tubers middling size and of *good* quality.
8	Do. The middle cuts.	Large Small	7	2½ 2½	7	5	11	7½	Tubers large and of bad quality.
9	The middle sized *whole* Potato.	Large Small	13 1	3½ 3½	14	7	22¼	14½	Tubers middling size and of *excellent* quality.

From these experiments, it would appear the following deductions may be drawn.

First.—That the failure of the Potato does neither seem to arise from disease in the tuber, nor from any cause connected with the soil, at least, in the present instance, as the *same soil* exhibited under precisely the same treatment, both success and failure.

Second.—If no failure existed, the usual method of cutting the Potato into sets, would yield a greater produce than the same weight of tubers planted entire, on the same surface of ground, as appears from Nos. 5 and 7.

Third.—In consequence of the *failure* of the *cut Potatoe,* it appears the safest method of culture, under existing circumstances, to plant the *whole Potatoe,* preferring the *middle size,* as evidenced by No. 9.

Fourth.—In planting the whole Potato, it seems that an important advantage is gained in point of *earliness*. For late situations this must be important.

Fifth.—That amongst the different experiments of the cut Potato, those planted with the *rose ends or cuts*, appear to have a very striking advantage over the other parts of the cut Potato, as Nos. 5 and 7. In my opinion, very clearly pointing out the *natural* tendency of this under-ground shoot or tuber, to be extended from that end; and to me, an additional proof of the propriety of planting this root entire.

From these results, connected with all the evidence I have been able to bring to bear on this interesting subject, I would conclude, with much deference, that the late failures in the Potato crops, have not arisen from any one of the causes already assigned.

Two important questions do then suggest themselves.

First.—What are the causes of the failure?

Second.—How is the failure to be guarded against?

In proposing to answer these questions, I would, in reference to the first, state briefly, that I consider the remote cause of the late failures to arise chiefly from an *atmospheric influence*, acting upon the *cut*, or *bruised* Potato; producing an immediate change in the consistency of the pulp of that root, to the destruction of the principle of vegetation.

In coming to this conclusion, I think there has been the strongest evidence of the correctness of my opinion. I shall here take the opportunity of bringing forward some curious matters of fact, which I think go far to establish the opinion I have formed.

In the immediate neighbourhood of Dublin, as well as in more distant parts of the country, it has been well authenticated, that cases have frequently occurred, where the *same seed*, cut at the *same time*, and planted on the *same day*, have proved great failures in one portion of the beds or drills, whilst the other portion has produced an excellent crop.

Instances have occurred, where even the Potato planted *whole* has failed considerably. But this apparent anomaly, may, I humbly conceive, be accounted for upon the very same principle as in the case of the cut Potato, which I shall presently explain.

With all these circumstances before us I shall proceed to state my reasons for the opinion I have formed, respecting the failure of the Potato.

Whilst I am convinced that much of the failure has arisen from the *unkind* treatment that this valuable root has too frequently to undergo previous to planting, I must, notwithstanding, say, that considering the remarkable circumstances of the culture of that root *now*, in comparison to that of *former times*, when it might almost be cut in any way, and appeared to grow freely, has led me to conclude, as already stated.

Let us now follow reason and analogy on this important point, the remote cause of the failure.

That animal and vegetable life depend very much upon similar

influences, is, I believe, a generally admitted fact. That animal life is frequently cut short from certain *predisposing* causes in the subject, when acted on by a *contagious* atmosphere, is also, I believe, admitted. We know, that for several seasons back the extreme cases of atmospheric change in our climate have been considerably *altered*, this is evident from the remarkable *mildness* of our winters.

I believe it has also been considered, that epidemic disease has been supposed to follow in the course of certain *currents* of air, and that this has been remarkably verified in many parts of Great Britain, during the last two or three years.

It may at the same time be adduced, that the *electric* state of the atmosphere, is also supposed greatly to influence, both *animal* and *vegetable* life, witness for example, the case of blights, which I have no doubt may yet be found to arise principally from this, as yet, I believe, very imperfectly understood, but interesting branch of science.

If such be true, I would then upon a principle of parallel reasoning conclude, that the air may at *certain times*, and in *certain places*, be equally destructive of the vegetative principle in *seeds*, or tubers, according to the way in which their parts may be exposed; more especially *tubers*, which I think, should in few cases be long exposed to the *air* or *light*, *more particularly* in *spring*, when the fluids are in motion. As an evidence of the effects of the atmosphere and light on the Potato, the quality of it is much changed by exposure, even when growing on the parent stem. The *green potato* is usually rejected as unfit for use, in truth, it is considered to be poisonous.

The Potato is a tuber, provided with a certain *skin* or covering, evidently designed as a protection to the parts within; under this covering are contained all the future parts of the plant in embryo, provided with a reservoir of nutriment, in the mass, of which the tuber is composed. The *external* construction of the Potato, also points out the necessity of *care* in preserving the *eyes*, or buds, from being injured, by the inequality of its surface.

In cutting up the Potato into sets a considerable portion of the vessels must be destroyed, besides, a large portion of the interior of the tuber is exposed to the action of the atmosphere, the which being charged with any principle destructive of the power of vegetation in that root, may be productive of failure.

But to come to the more *proximate* causes of failure, I shall present the following considerations:—

The treatment which the *imported* Potato receives, between the time of being dug out of the ground and planted, is a matter of serious moment: they are first either put into pits or stored in the house, then it is more than likely they are *picked* and *turned;* after this they are driven from cart to ship, dashed into the hold, *cut* and *bruised* by wooden shovels and heavy shoes—then again, from ship to cart, and from cart to house, and to sum up all, are *cut into pieces;* after such treatment is it to be wondered at that many of them should fail?

It is here I would account for the partial failure of the whole Potato —that is, in proportion as the *exterior* surface of the tuber has been *bruised* or *cut*, the atmosphere tending to putrefaction, or the destruction of the vegetative principle in the Potato, will of course act upon the *exposed* parts of the *interior* of the *whole* Potato as it would do in the *cut sets.*

In examining the sets of Potatoes that failed, I have found the *thick covering* sound, and the *inside* part a mass of corruption; in such cases the small wire-like shoots pointed out sufficiently the want of their *first* nutriment.

There can be no doubt but the raising of *new* varieties of the Potato, from *seed* saved from the Apple, deserves the greatest attention, let the present causes of failure be what they may; as this is unquestionably the most certain method of continuing *health* and *vigour* in the produce of this inestimable root. It may be a matter of interest to know, that not only *full sized* Potatoes can be produced from seed sown the same season, but also a full crop. At the present time I have upwards of fifty varieties raised from seed sown *this season*, in the month of May, (which was late,) and in some instances there are upwards of fifty tubers, large and small, from each plant. I know also of two similar instances, where a like success has attended the raising of Potatoes from seed sown this year.

I may add, that it is my intention to make the seedlings raised here, the subject of continued experiment next season, having carefully *noted* the *character* of *each variety*, both as regards *luxuriance* of foliage, and *productiveness.*

Having thus far considered the subject matter of this Essay, I would respectfully conclude my observations by stating, that as far as the time afforded would admit, I have endeavoured, both by *experiment* and *observation*, to bestow the most careful investigation on the important subject under consideration—the Failure of the Potato.—*Irish Farmer's Magazine.*

DRY ROT.

A notice of the discovery of an undoubted prevention of dry-rot in ships and buildings, appeared some time since in the *Literary Gazette.* As the results promise to be advantageous to the country in a very eminent degree, we are induced to return to the process more in detail.

The discovery formed the subject of one of Mr. Faraday's lectures at the Royal Institution, from which we shall borrow some remarks; and as we are convinced of it's importance and value, shall proceed to illustrate the learned gentleman's statement of facts, and exhibit to the reader the surprising amount of expenditure caused to the nation by the existence and prevalence of this disease in timber.

Mr, Faraday exhibited to his audience several specimens of wood affected by the dry-rot, and a piece of dry-rot fungus from the con-

servatory of the Duke of Norfolk, which had prospered so much that even it's fructification was fully developed. Another specimen from Brighton Pier was also exhibited, and part of a ship's mast, which, though sound on the outside, to all appearance, was hollowed within as if it had been done by the tool of a workman.

With respect to the dry-rot in ships, the learned professor said, that he had himself gone on board his Majesty's frigate Thalia, to see the state of her timbers, and that a reference to one or two cases of decay in such vessels would exhibit facts most extraordinary, taking into calculation the enormous expense incurred from the operation of dry-rot. A first-rate, carrying 90 guns or upwards, consumed in her construction 5880 loads of timber; a second-rate, or 80 gun ship, consumed 4839 loads; a third-rate 3600 loads; a fourth-rate 2732 loads; a fifth-rate 1800 loads; and a sixth-rate 963 loads. The statements which appeared in the *Quarterly Review*, some of which he would read, would give those who had not attended to the subject some idea of the importance of the present inquiry.

The Rodney was launched in 1809; she had scarcely put to sea, when, owing to the unseasoned state of her timbers, all her fastenings became loose; and it was found necessary to bring her home from the Mediterranean in 1812, to be paid off. The next example was that of the Dublin, launched in February 1812, commissioned in August, sent upon a cruise in December, from which she returned in 1813—one year from the time of her being launched, when she was repaired at an expense of £20,000.

The Queen Charlotte was built in 1810, and broken up in 1811; and of three other ships, the St. Domingo, Blake, and Florida, not one lasted more than five years. In 1814 fifteen frigates were built of Canada red pine, and three frigates of Canada white pine, which lasted on the average three years and a half.

In building and repairing ships, docks, and buildings belonging to the king's naval service of Great Britain, there was expended in ten years, from 1823 to 1833 inclusive, £8,432,044 7s. 4d.—the existing navy, comprising an aggregate amount of 1,216,719 loads of timber, which, valued at £6 per load, represents a capital of 7,300,314 pounds sterling.

This statement is submitted in order to give the reader an idea of the magnitude of the saving to be effected in one branch of the national expenditure by the introduction of a preventive of the dry-rot; to the devastating qualities of which is attributable the enormous charge upon the vast capital under the head of "wear and tear."

We now come to the discovery. A gentleman of the name of Kyan, considering the well-known anti-destructive qualities of corrosive sublimate, proposed to apply that active body to timber, in order to secure it from the attacks of the formidable disease to which it has hitherto been liable, arising either from the action of the seeds of cryptogamous plants vegetating in the wood, or from the presence of the albuminous parts of the tree—he thought the evil might be stopped, that the com-

mencement even might be prevented, by the application of corrosive sublimate, in consequence of the chemical combination which takes place between the corrosive sublimate and those albuminous particles which Berzelius, and others of the highest authority, consider to exist in and form the essence of wood; which being the first parts to run to decay, cause others to decay with them.

Mr. Kyan was so confident of success, that he submitted his proposition to the Lords of the Admiralty, who, in the first instance, required trials to be made, in order to prove the value of the application. These trials were made; and, at the end of two or three years, their lordships advised Mr. Kyan to take out a patent, which he did.

Of these trials so required by the Admiralty, and their results, it is now necessary to say a few words. The process is in itself exceedingly simple. The timber is immersed in a solution of the corrosive sublimate, which is pumped into a tank, in which the timber is held down by tranverse beams, so as to prevent it's floating; and, after submersion for a week, the operation is completed.

Professor Faraday exhibited to his auditors some of the pieces submitted to trial by the Lords of the Admiralty three years before, in the fungus-pit at Woolwich—a pit dug in the yard and enclosed on all sides by wood, having a double wooden cover. It was damp of itself; and into this were put the various kinds of wood of which they wished to make trial. One specimen was a piece of timber which came out, at the end of the three years, as sound as it went in, while the unprepared part had decayed up to the very point. No portion of it had been left; it had decayed and become rotten throughout; but the other piece was left whole and sound, and fit for the construction of vessels.

A large cube of wood, which had been there, in the first instance, for three years,—found sound at the end of that period, and returned to the pit for two years more, making, altogether, five years,—was taken out on the 19th of February last, perfectly hard and sound. There was no sign of decay in that wood, which had been submitted to the rotting action for five years, nor of that destruction which seems to have come on so soon in the same pit with other pieces of wood.

Sir Robert Smirke had a couple of posts put up under a dripping eave, and both were exposed to the same action. After a certain time, one of them decayed: the other still stands, having been preserved by the power of this substance. Similar effects were exhibited of it's efficacy upon other substances—rope, canvass, and cotton. Several specimens of these articles were shewn, which had been purposely exposed to damp in a cellar from the 10th of December, 1832, and left until the 21st of February, 1833—a prepared piece and an unprepared one, which had been coiled up in a cellar from the 15th of December, 1832, to the 21st of February, 1833; and the opposite effects were produced by the same circumstances on exposure, upon prepared and unprepared calico; one was as it went in; the other was the calico

corresponding to it which had rotted and decayed; it was not possible to unfold without destroying it, yet it had been similarly exposed with the first.

Mr. Faraday proceeded to detail a number of experiments which he had made with a view to discover whether the effects of the corrosive sublimate might be injurious, and which had the effect of satisfying him that it could not be so; and as far as these experiments went to strengthen his opinion as to it's efficacy as a preventive of dry-rot, he says, that he is of opinion that the process would be effectual, and added, "I think the improvement so great as fully to justify it's extensive application."

In conclusion, the learned professor observed, that if the hopes which the process afforded were fully borne out, it's employment must have such extensive application as mightily to improve the great subjects to which it may be applied, and the trade connected with them. Who could doubt, especially after the very various causes of decay and destruction that were going on in town in the midst of us, that the protection of timber, so as to make it resist continually this sort of decay, was a most important subject? He was inclined to think it would be found useful in a far higher degree in the construction of cottages and outhouses, than palaces; for, it was of far more importance to those whose means were small, that they should have that duration given to their timber which would extend the application of their means, and give permanency to their comforts.

It is evident, that the application of wood, if it could be rendered durable, would be more extensive than it is at present; and, consequently, timber, now almost valueless, from Canada and the north of Scotland, might come into extensive use. Mr. Faraday declined entering into any calculation upon that point; but the view was sufficient to justify inquiry into any process which professes to effect these changes and confer such consequent benefit upon mankind.

The experience of five years affords ample security for the success of the discovery. The trials have completely satisfied the minds of all who have interested themselves in the question; and we believe, unless circumstances of a political character had not occurred to break up the ministry, the final decision of government, as to it's adoption, might soon have been expected. At present the process has been adopted with the timber used in building the addition to the Temple, King's College, Clerkenwell Church, Westminster House of Correction, and Fishmongers' Hall; the National Gallery, the new works at the British Museum, and the warehouses of the East India Company; and several churches in town and country. The London Dock Company have also adopted it, and many engineers connected with the Liverpool and Manchester, Stanhope, Tyre, and Wear rail-ways, in lieu of stone sleepers.

In addition to these marks of encouragement, the process has been adopted by the ship-builders of the Isle of Wight and of the river Thames; and has been explicitly ordered to be used by the merchants

engaged in the South Sea fishery, for several ships recently laid down for that trade; and by the ship-owners at Leith, and throughout the north, for all vessels, the building of which is now commencing. The French and other foreign governments are causing experiments to be made under their orders, and several noblemen, amongst whom are the Earls of Egremont and Veralum, and Lord Bridport have adopted it in their domestic architecture.

It is extremely gratifying to find the results of a scientific discovery, or at least the judicious application of a yet untried specific, so fraught with advantages to mankind. As Mr. Faraday observed in the conclusion of his lecture, "the object was not here, as in some instances, the ready destruction of life and property; but it consisted of a benefit, connected with more social and pleasant feelings, and touching the permanent and mutual interests of mankind."

Having ourselves seen the specimens referred to, we are enabled to add our personal testimony to the surprising effects produced; and we consider it a duty to our countrymen to circulate, by all means in our power, the knowledge of so important a desideratum.—*Literary Gazette.*

PARING AND BURNING.

The principle upon which nature acts in the case of *paring and burning* the surface vegetation, or, as it is called, *down-shearing*, should be better understood than it is in general by farmers. Few of them know why it does, or why it does not, do them a service in particular situations. Experience here is their only guide. We will consider the subject, and endeavour to throw some light on the operation. *Paring and burning* will destroy worms, slugs, and insects of all sorts; this is good: but we ask, how will it fertilize the land? To answer this question satisfactorily, we must cast aside all prejudice, and go to Nature, examine her chemically, and she will pay us for the search. Custom, we all know, fetters men with chains. To break loose from those chains, a man must have energy, and strength of mind, to act for himself.

The quality of soils may be ascertained by washings, by fire, or by the test of a mineral acid. A good soil, accordingly, when its component parts are known, may be imitated. Before a burning of the surface takes place, the earth under the vegetation should be examined. If it does not form bubbles of air with spirits of salt, a burning should not take place; for by burning, much of the vegetable matter, which is principally carbon is driven off. Now, if there be not too much carbon, why cast it off? It is only in chalky or peaty soils, or where there is a good depth of vegetable mould, with ample carbon, that this practice can be followed, without great discrimination. The necessity of the burning generally arises from an old lay or grass land, having become mossy or rushy. After the operation of burning, let a dressing of

chalk, or chalk-marl, or quick-lime, be put on the land previous to ploughing in the ashes, unless such materials are already sufficiently in the soil.

The ashes from a burning are sure to make a soil work much lighter, but this is not wanted in a sandy district. It has been here advanced, that one of the principal ends of agriculture is to make the soil hold just that sufficiency of moisture, necessary for the plants to grow upon it, and to imbibe from the air at night as much as it may have lost by the action of the sun during the day. Now burning drives off the carbon, which is so greedy of moisture, and therefore should not be practised except on peculiar soils.

An absorbent or a tenacious soil, before it is burnt, will adhere to the tongue, from its being greedy of moisture, but after burning, it will scarcely be perceived to do so. *Burning* renders all soils less compact, less tenacious, and less retentive of moisture; but where this is properly applied, it may be the very making of a surface soil.

The *vegetable matter* of the turf, is, by burning, immediately converted into a manure; the best part goes off in smoke; whereas, the turf being turned into the soil, would require many months to answer this purpose. *Quick-lime* at all times assists the decomposition of animal as well as of vegetable matter; and burning a chalky soil with superfluous vegetation, may therefore, much assist a surface. Lime, in a caustic state, will most readily combine with other earths.

SPADE HUSBANDRY.

BY MR. ARCHIBALD SCOTT.

The following letter on this important subject was addressed by Mr. Archibald Scott, of Southfield, near Haddington, in East Lothian, and obtained the prize of £100, which the Rev. C. Gardiner, a Clergyman of the Church of England, had offered to any person who should devise a better plan than the present poor law of Scotland, for giving employment to the labouring poor of England.

On glancing over last week's newspaper, I observed, says Mr. Scott, £100 reward offered for any better plan than the present poor law of Scotland for finding employment for the surplus labourers of England, consequently making bread plenty, corn laws useless, enriching farmers, raising falling rents, and finding a home market for manufacturers.

As I certainly felt very much gratified in perusing the advertisement, I determined to forward to you my views on the subject; not that I had any expectation of being entitled to the reward, but because I consider your liberal offer entitles you to every information on so very important a subject.

It is impossible, for me at least, to offer any improvement on the present Scotch poor laws, and as I presume you are thoroughly ac-

quainted with their workings, I shall forbear any further remark than simply to state that only the aged, the sick, and the infirm derive any benefit from them; and that the able-bodied labourer, though he may find it impossible to obtain work, has no claim to parochial relief. This, I think, is just as it should be, and is in reality a great blessing to the Scotch peasantry; they are, in consequence, trained up with notions of independence, as they are aware that they have themselves, and themselves alone, to look to for support, and the knowledge of this makes them prudent, industrious, and economical.

Notwithstanding all this, I am quite aware that there are many cases of great hardship and great individual distress, at particular seasons of the year, from want of employment; but this, I am afraid, cannot be satisfactorily remedied by any system of poor laws or legislative enactments; it is the landed proprietors and their tenantry who alone can do it, yet it becomes an object of paramount importance to the landed interest of the kingdom.

I am quite convinced there is but one way of employing the surplus population of England and Ireland, and that is by a judicious introduction of spade husbandry; and I am also convinced that a system of management can be pointed out whereby every labourer of Great Britain might be employed with profit to his employer and advantage to the country.

I should think it will hardly be denied by any one at all versant in agricultural operations, that work done by the spade is superior to work done by the plough, and that the only drawback is the great additional expense. Now, if I can shew that, at a particular period of the rotation, spade husbandry is not only superior, but less expensive, I shall have got over this difficulty.

To show that I am not a mere theorist, but a practical man, I may mention that I rent a farm from the Earl of Wemyss in East Lothian, consisting of 530 Scotch acres; that I have cultivated land to a considerable extent with the spade for the last three years, and that the result has exceeded my most sanguine expectations. 'As facts are stubborn things,' I shall lay before you my system, crops, expenses, and profits.

In 1831, I determined to ascertain the difference of the expense and produce between trenching land with the spade, and summer fallowing with the plough in the usual way: I therefore trenched thirteen acres of my summer fallow-break in the months of June and July; I found the soil about fourteen inches deep, and I turned it completely over, thereby putting up a clean and fresh soil in the room of the foul and exhausted mould, which I was careful to put at the bottom of the trench: this operation I found cost about £4 10s. per Scotch acre, paying my labourers with 1s. 6d. per day: the rest of the field, which consisted of nine acres, I wrought with the plough in the usual way, giving it six furrows, with the suitable harrowing. I manured the field in August; the trenched got eight cart loads per acre, the ploughed land sixteen; the field was sown in the middle of September. The whole

turned out a bulky crop as to straw, particularly the trenched portion, which was very much lodged. On thrashing them out I found them to stand as under.

By trenched wheat per acre, 52 bushels at 6s. 9d.				£17	11	0
To two years' rent at £2 10s. per acre,	£5	0	0			
Expense of trenching,	4	10	0			
Seed, three bushels at 6s. 9d.	1	0	3			
Eight cart-loads of manure, at 4s.	1	12	0			
Expense of cutting, thrashing, and marketing,	1	10	0			
Profit,	3	18	9			
				£17	11	0

By ploughed wheat per acre, 42 bushels at 6s. 9d.				£14	3	6
To two years' rent, at £2 10s. per acre,	£5	0	0			
Six furrows and harrowing, at 10s.	3	0	0			
Seed, three bushels at 6s. 9d.	1	0	3			
Sixteen cart-loads of manure, at 4s.	3	4	0			
Expense of cutting, thrashing, and marketing,	1	10	0			
Profit	0	9	3			
				£14	3	6

I now saw, that though it might be difficult to trench over my fallow-break during the summer months, it was by no means making the most of the system, as the operation was not only more expensive, owing to the land being hard and dry during the summer, but that it was a useless waste of time to take a whole year to perform an operation that could be as well done in a few weeks, provided labourers could be had; and as in all agricultural operations, losing time is losing money, as the rent must be paid whether the land is carrying a crop or not, so that in taking one year to fallow the land, and another to grow the crop, two years' rent must be charged against the crop, or at least there must be a rent charged against the rotation of crops for the year the land was fallow. As I felt satisfied that by trenching with the spade, the land would derive all the advantages of a summer fallowing, and avoid all the disadvantages attending it, I determined on trenching 34 acres of my fallow-break immediately on the crop being removed from the ground, and had it sown with wheat by the middle of November, 1832. I may here remark, that I did not apply any manure, as I thought the former crop was injured by being too bulky. As it is now thrashed out and disposed of, the crop per acre stands as follows:

By average of thirty-four bushels per acre at 7s.				£15	8	0
To rent of land per acre,	£2	10	0			
Expense of trenching,	4	0	0			
Seed,	1	1	0			
Cutting, thrashing, and marketing,	1	10	0			
Profit,	6	7	0			
				£15	8	0

The advantages of trenching over summer fallow, are, in my opinion, very decided, as it is not only cheaper, but, as far as I can yet judge, much more effectual. I am so satisfied of this, not only from the experiments above noticed, but from the apparent condition

of the land after it has carried the crop, that I have this autumn cultivated about a hundred acres with the spade, and the crops at present are very promising. When I first commenced, I was laughed at by my neighbours, but now when they see me persevering in what they considered a very chimerical project, they are suspending their judgment, and several of them have made considerable experiments this year. I should think there are at least 250 acres under crop cultivated in this way this season in East Lothian: in 1831, the year I commenced, there was not a single acre. I have therefore the satisfaction of knowing, that I have been the means of causing £1000 to be spent this year amongst the labouring classes in my immediate neighbourhood, and I feel confident, that should the season turn out favourable for the wheat crop, and fair prices obtained, their employers will be handsomely remunerated for their outlay. I do not say that this system will succeed in every description of soil, as it must necessarily be of some depth to admit of the operation; but there are few districts where such soil will not be found in sufficient abundance to give ample employment to the surplus population of the neighbourhood.

Now this is going on in a county where agricultural labourers *are better employed* than almost any other in Great Britain. The system was not introduced, nor is it persevered in, for the purpose of giving employment to the poor, but entirely for the benefit of the employer.

The East Lothian Agricultural Society are now offering premiums for the most satisfactory reports on the subject. I last year received a medal from the Highland Society of Scotland for introducing the system; and what I value still more, I received a piece of plate from the labourers I employed as a token of their gratitude.

The system, I admit, is only in its infancy, but I have this year put it completely to the test; and should it succeed as well as it has done hitherto, it must take root and spread over the kingdom; and the landed interest in those districts of England, where the poor laws are so oppressive, and still more, the Irish proprietors, will do well to investigate the system, and have it introduced with the least possible delay, that what is now a burden on their estates may become a source of wealth, and what is now a curse may become a blessing.

This system, if it succeed to my expectation, possesses all the requisites you require; it furnishes employment for the surplus population by substituting manual labour for that of horses, and certainly if there is a want of food for both, it is desirable that the one should give place to the other. It will make bread plenty, as the naked summer-fallows of Great Britain will be covered with grain instead of lying waste for a season; it will render corn laws unnecessary, as we will be then independent of foreign supplies; farmers will be enriched who are enterprising and industrious, and they only deserve to be so; it will raise rents, by increasing the capabilities of the soil, enabling the farmer to cultivate wheat to double the present extent; it will raise up a home market for our manufactures, as the paupers, who are at present starving, or living a burden on the parish, will find employment, and

thereby be enabled to procure the necessaries and comforts of life; it will check the poor laws, as there will then be none but the aged and the helpless dependent on parochial aid.

If you should think it worth while to make further inquiry after the writer or his system, I beg to refer you either to the Marquis of Tweeddale, Lord Lieutenant of the county of East Lothian, or to Robert Stewart, Esq., M.P. for Haddington district of burghs both of whom are at present in London; or if you would like a more detailed account of the agricultural part of my scheme, I shall feel most happy to give you every information in my power.

THE ENCOURAGEMENT OF AGRICULTURE AS A SCIENCE.

In Holland, each student of divinity is obliged to attend a two years' course of lectures on Agriculture before being licensed. The great advantage of adopting such a regulation must be obvious, where every minister's glebe might become the experimental fields or the model for the parish, and the minister himself, in this respect, the disseminator of every new improvement.

THE LAWTON HYBRID TURNIP, A NEW VARIETY.

We have to introduce to the notice of agriculturists, another new and valuable turnip for field culture. This variety is a hybrid between the *green-topped Swede* and the *green-topped white Globe*, raised by James Wright, Esq. of Lawton, Strathmore, Perthshire; hence the name. From trials which have been made in various parts of the country during the last season, this variety seems deserving of cultivation. It is a white turnip with a green top, and possesses the advantages of being hardier, and yielding a greater crop than any other of the white turnips at present cultivated in the fields, qualities which render it well worth the attention of farmers.—*Quarterly Journal of Agriculture.*

THE OX.

The breed must be adapted to the means, natural or acquired, possessed of supplying food. Art and an improved system of tillage do much in supplying the food of herbivorous animals. By cultivation we can change the nature, and increase the abundance, of the food supplied. But in many cases, tillage is only practicable or expedient to a limited degree, and then the natural pastures of the country must furnish the main supplies of food. In a mountainous country, where the principal food is natural herbage, and where the means do not exist of obtaining artificial food, it would be vain to attempt the rearing of a large and fine breed of oxen. We must, in such a case, be satisfied to rear a race, with hardy properties, of small size, and capable of subsisting on coarse herbage.

Where, again, art or the natural fertility of a country admits of supplying sufficient food, the study of the breeder should be to select a race of animals, the best that circumstances will allow him to rear.

Having fixed on the kind of breed which is the best suited to the circumstances of the district or farm, the practical question to be determined, is the manner in which a proper breed should be obtained, or the old one improved. There are three methods which may be adopted for this purpose :—

1. The entire change of the existing stock, and the substitution of a different breed, females as well as males.

2. The retaining of the old breed, male and female, and improving them by breeding from the best animals of the same breed.

3. Thé improving of the breed by crossing with males of a different breed.

When the nature of a farm allows, the most speedy and the best method certainly of attaining the object is to change the stock, and to substitute females of the improved one from which it is proposed to breed. In this manner the object will be attained at once, without the labour or loss of time of improving a defective stock.

The second method is the retaining of the existing stock, and improving it by a selection of the best individuals of the same breed. This is the method which ought to be adopted if the breed already existing is sufficiently suited to the natural circumstances of the farm, and to the method of cultivation which can be pursued upon it.

The third method is that of crossing, that is, the retaining of the females, and the employing of males of a different breed. This method has often led to disappointment, from the nature of the crosses attempted, especially where the crosses have been violent, as between animals of very different characters. The first cross in general will be good, but in breeding from the progeny of this cross, expectation will often be disappointed. Not only do the good qualities of the first cross not always remain in the progeny, but often there are found in it defects which cannot be traced to the parents.

This, however, generally arises from injudicious crossing, and from unacquaintance with the principle on which the crosses of different animals should be conducted. When a cross is made, it should be with a male of a superior breed; and in this case the first cross will be almost always a good animal. To secure the benefits of the cross, however, we should not again resort to the males of the inferior stock, because it might be found, that, while we had injured the original breed, we had not substituted a better in its stead. The rule, therefore, should be, to cover again the first cross with a superior male of the same breed, and so on, until the good character of that breed became permanent in the progeny. This is said to be breeding up to the superior stock.

In crossing, the essential characters of form are imprinted on the offspring by the male; and it is surprising in how great a degree this imprinting of better characters takes place when a male of superior breeding is employed. A first cross between a short-horned bull, for example, fully bred, and a very ordinary cow, produces, not only often, but generally, a fine animal, with an extraordinary aptitude to fatten.

Many of the very fat animals that receive premiums at the cattle-shows in this country, are extreme crosses of this kind. But the benefit may end with the progeny, if we do not again cover with a male of the same superior breed, and so on until the good characters become permanent.

When a breeder, then, is to improve his stock by crossing, he ought to select a male of undoubtedly superior blood. And he should not generally, after the first cross, resort to the males of the defective breed, but to those of the superior one, until he has formed, as it were, a breed for himself. There are, indeed, numerous cases in which a single mixture of better blood will do good, as with those inferior breeds which have no fixed characters. These will be improved by even the slightest intermixture with the blood of a better race; and a farmer who is in a district where this class of animals prevails, may safely avail himself of a good male, in the same manner as a breeder of horses would do, although the stallion were of a different character from the native stock. The cases where crossing of any kind is to be attempted with caution, are when a breed of established good characters, or of characters which fit it for the nature of the country and the state of its agriculture, already exists.

In crossing, then, the rule is, to breed from a male of a superior stock; and, fortunately, in this country we have now a breed of such established character, that no mistake can arise in the selection of males. These have been formed to our hand, with all the care that art can bestow in improving the form of feeding animals. There is no need, therefore, for those mistaken attempts at crosses which were sometimes made with males of questionable characters, as between an Ayrshire cow and a Galloway bull, and *vice versa*. We can predicate nothing securely of the progeny of such crosses as these, the effect of which will probably be to destroy the good properties of either breed, as the aptitude to yield milk of the Ayrshire, and the hardy and feeding qualities of the Galloway. But in crossing with a breed so highly cultivated as the short-horned, the breeder has the assurance that he will produce animals of large size and good feeding properties. He is to consider, indeed, whether he has the means at his command of rearing the larger animals; and if this be so, it will be better that he at once form his stock upon the best model, than run the hazard of wasting time and capital on questionable crosses.

And it must be regarded as highly important as a mean of improving the live-stock of Great Britain, that a breed has been actually formed, by long continued selection and care, which may always be resorted to, to effect the purposes required, in the same manner as recourse is had to horses of known pedigree, to communicate their characters to the progeny. In this manner the labours of those who have improved the short-horned breed, have extended far beyond what the original breeders contemplated. They have not only improved a peculiar breed, but have furnished the most efficient means that can be used of improving the live-stock of the entire country; and it is to be trusted that the breeders of this class of animals will have encouragement to maintain

the characters of the breed with as much care as is used in the case of the race-horse, seeing that it is for a far more important object.

But having selected the breed, or having fixed on the means to be employed for forming it, a point to be determined is the manner of maintaining or improving it, by the selection of good individuals, male and female; for it is to be observed, that it is equally determined, in the case of the ox as of the horse, that the properties of the parents are conveyed to the offspring. The male undoubtedly acts the principal part in impressing his characters on the young. But the form of the female is of the utmost importance; and if we hope to arrive at success in breeding, the form and characters of the female must be no more neglected than those of the male.

Now we might breed either from animals nearly allied to each other in blood, as brothers and sisters, parents and their offspring, technically termed breeding in-and-in, or from animals of different families. By the latter method are produced animals more hardy and less subject to disease; by the former, we are frequently enabled to produce animals of more delicate form, and greater fattening properties, and above all to give a greater permanence to the characters of the parents in the offspring. It is known, that Bakewell and other breeders were enabled, by this system, to give and perpetuate the peculiar characters of their stock. These first improvers, indeed, found the practice to be, to a certain extent, necessary, because they could not resort to the males of other families, without employing inferior animals, and so impairing the properties of their own breed.

It is to be observed, that the breeding and continuing to breed from animals very near of blood, produces animals which have a greater tendency to arrive at maturity, and to become fat. This seems to result from a tendency to premature age in the animal, which thus more quickly arrives at its maturity of bone and muscle, and so begins sooner to secrete fat.

The system, however, of breeding from animals near of blood, has its limits. Nature will not be forced too far for our purposes. It is known that, although this joining of animals closely allied diminishes the size of the bones, and gives a tendency to fatten to the progeny, it renders them also more delicate and subject to diseases. Although, then, this near breeding may be carried to a limited extent between very fine animals, for the purpose of rendering their qualities permanent in the offspring, we do a violence to nature when we carry it too far. The progeny, along with their early maturity and aptitude to fatten, become feeble; the cows cease to secrete milk in sufficient quantity to nourish their young; and the males lose their masculine characters, and become incapable of propagating their race.

When, therefore, the stock of any farmer has become too nearly allied, he ought not to fail to change his males, and procure the best of the same breed. This is essential to preserve the health of the stock for any time. Great losses have been sustained by breeders who have carried the system of close breeding too far, with the design of pushing the improvement of their breed to its limits.

A character of a breed not to be neglected, is size of the individuals. Although large animals consume more food than small animals of the same species, yet they do not consume food in proportion to their greater size; and hence the benefit of rearing the larger animals, if the natural or acquired productiveness of the farm will allow it. But although size be an important element in the character of a breed, there is another property to which that of size is subordinate, namely, that of a disposition to quick fattening and early maturity. This property depends not on size, but on a different class of characters.—*Low's Agriculture.*

INSTRUCTIONS IN HORSEMANSHIP.

The chief requisite for becoming a good horseman is confidence; and this once obtained, a good seat, as it is commonly called, is not very difficult of attainment. It is undoubtedly the chief, though not the only point in riding, to be able to sit a horse without danger of being thrown. It is a common custom in military equitation, to ride with very long stirrups, to sit perfectly erect, and to move but little in the saddle, that is to say, the motion of rising in the stirrups when trotting, is, as much as possible, avoided. The seat is to be placed well down on the saddle; that is, not projecting back towards the cantle, but, in riding-masters' phrase, kept "well under the rider." To effect this, the body must be thrown back, and the legs and arms kept steady. The best mode of learning to ride is to begin without any stirrups, so as not to acquire a habit of placing too much reliance upon them, for the firmness of a man's seat on horseback mainly depends upon the knees and thighs, although in some cases, as in leaping, the calf of the leg is of great service. The leg should be placed, as near as possible, so that a line dropped from the knee may touch the toe; the ball of the foot should rest in the stirrup, and the heel be inclined downwards and turned out, but not too much so, by which means the knee has a firmer hold of the saddle. The right hand, when not used, is, by soldiers, allowed to drop rather behind the corresponding thigh. On putting a horse into a trot, both legs should be equally pressed to his body; but, for the purpose of making him canter, the heel of the rider opposite to the leg which the horse is required to strike or lead with, should be applied to his side smartly and farther back than the other heel: thus, to make a horse lead with the right leg, close both legs upon him at the same time, but press firmest and farthest back with the left, at the same time shortening the left rein, so as to incline his head to that side, and throw his hind quarters the other way; *et vice versa*. Some horses require lifting with the hand to make them canter; but though, at this pace, it is well to raise the horse in a slight degree at every stroke, yet it has a very ugly appearance to see a man jerking his horse's head previously to putting him into a canter, and resembles that elegant trick, which several old gentlemen practice, of tugging three or four times at the reign when driving, in order to accelerate the pace of their beast. The use of the hand is of the very

greatest importance in riding. The general mode of holding the reins taught in military schools, is as follows: To take up a single snaffle bridle, place the little finger between the two reins, then draw them, through the palm of the hand, turn the ends over the forefinger, and close the thumb upon it, at the same time shutting the hand. If a double bridle, after taking up the snaffle as before described, and before shutting the hand, draw the curb rein on one side through the palm until of the same length as the snaffle, and then take up the loose part with the right hand, passing it between the fourth and ring-finger, and the first finger and thumb; or if both bridles be held in one hand, the third finger may be passed between the snaffle rein, and the fourth between the curb, after which both are to be brought over the forefinger, and held fast by the thumb. In riding on the road, the stirrups are generally shortened so as to permit a slight rise from the saddle while the horse is trotting; a motion both pleasanter to the rider and easier to the animal than the jog-jog pace at which soldiers are taught to ride. In hunting, crossing the country, and racing, the stirrups are still more shortened by a hole or two than when on the road; by which means the horseman is enabled to stand in his stirrups, and avoid touching the saddle; a position less wearisome to a horse than the former, but only practicable at a gallop. The expression of "*standing in the stirrups,*" is very common, although, were this to be actually practised, it is questionable whether it would be so easy to a horse as when the rider sits firm on the saddle; but the fact is that, instead of bearing the whole weight on the stirrups, the body should be mainly supported by gripping the saddle firmly with the knee, both in this position and every other. In leaping, the knee and thigh are chiefly to be depended on; some people, indeed, quit their stirrups previous to taking a high leap, for fear of the foot being entangled in case the horse should fall. The body should be slightly inclined forward when the horse rises to leap, and thrown backwards as he falls; the thigh and knee should keep a firm hold of the saddle, and the leg, thrown rather backwards, should be tightly pressed against the horse's belly, taking care, however, not to hold on by the spurs. Many horses are thrown down in leaping, by the awkwardness and indecision of their riders, who first run them at a fence, and, when near it, and too late to retract, wish they had not done so, endeavour to pull up, and thus check their horse while in the act of making his spring. When coming to a leap, therefore, make up your mind whether you will ride at it or not; and if you decide in favour of the former, go at it resolutely, and let no after-thought baulk your determination. In riding, whether on the road, or elsewhere, keep your arms and legs steady, for nothing looks worse than to see a man with out-stretched arms, as though he were going to leap out of his saddle, and working his legs to and fro, so as to merit the accusation of going faster than his horse. In racing, a horse should be kept well in hand, and, when spurred, the heels should be drawn back to his flanks with as little motion as possible, and not, as is frequently the case, kicked into him, when at the last rush, in such a manner as to expel the little wind he has left in him.—*Farmers' Magazine.*

THE HABITS OF THE PHEASANT.

BY CHARLES WATERTON, ESQ.

This splendid well-known inhabitant of our woods and plains is generally supposed to have come from Asia, though the time of its arrival in this cold and cloudy climate seems to be quite unknown.

A variety of this bird, sometimes spotted and sometimes milk-white, appears among the other pheasants, and breeds with them. I have never yet been able to perceive that it continues its white or varied plumage to the offspring. The plumage of the white or pied pheasant seems purely accidental, and is produced by a male and female of ordinary colours. The ring-neck pheasant, so common in the more northern parts of the kingdom, is never seen in this immediate neighbourhood.

By the laws of England, the pheasant is considered game; and the sportsman is under the necessity of taking out a licence from government, in order to qualify himself to shoot it. When we consider the habits of this bird, we are apt to doubt of the propriety of placing it under the denomination of *feræ natura;* and I am one of those who think it would be a better plan to put it on the same footing with the barn door fowl, by making it private property; that is, by considering it the property of the person in whose field or wood it may be found. The pheasant is a more than half-reclaimed bird. While the hare and the partridge wander in the wildest freedom through the land, heedless of the fostering care of man; the bird in question will come to us, at all hours of the day, to be fed. It will even sometimes associate with the poultry on the farm; and, where it is not disturbed, it will roost in trees, close to our habitations.

Its produce with the barn-door fowl is unprolific, and seems to have nothing to recommend it to our notice on the score of brilliancy of plumage, or of fineness of shape.

The pheasant crows at all seasons, on retiring to roost. It repeats the call, often during the night, and again at early dawn; and frequently in the daytime, on the appearance of an enemy, or at the report of a gun, or during a thunder-storm. I am of opinion that it does not pair. The female lays from seven to eighteen eggs; but in general the nest contains about twelve.

Notwithstanding the proximity of the pheasant to the nature of the barn-door fowl, still it has that within it which baffles every attempt on our part to render its domestication complete. What I allude to is, a most singular innate timidity, which never fails to show itself on the sudden and abrupt appearance of an object. I spent some months in trying to overcome this timorous propensity in the pheasant, but I failed completely in the attempt. The young birds which had been hatched under a domestic hen soon became very tame, and would even receive food from the hand, when it was offered cautiously to them. They would fly up to the window, and would feed in company with the common poultry. But, if any body approached them unawares, off

they went to the nearest cover, with surprising velocity. They remained in it till all was quiet, and then returned with their usual confidence. Two of them lost their lives in the water, by the unexpected appearance of a pointer, while the barn-door fowls seemed scarcely to notice the presence of the intruder. The rest took finally to the woods, at the commencement of the breeding season. This particular kind of timidity, which does not appear in our domestic fowls, seems to me to oppose the only, though, at the same time, an insurmountable, bar to our final triumph over the pheasant. After attentive observation, I can perceive nothing else, in the habits of the bird, to serve as a clue by which we may be enabled to trace the cause of failure in the many attempts which have been made to invite it to breed in our yards, and retire to rest with the barn-door fowl and turkey.

Pheasants would certainly be delightful ornaments to the lawn of the country gentleman, were it not for the annoying idea that, any night, from November to May, he runs the risk of getting a broken head, if he ventures out to disturb the sport of those who have assembled to destroy them. There must be something radically wrong in the game laws. How or when those laws are to be amended, is an affair of the legislature. The ornithologist can do no more than point out the grievance which they inflict upon society, and hope that there will soon be a change in them for the better. But to the point. Food and a quiet retreat are the two best offers that man can make to the feathered race, to induce them to take up their abode on his domain; and they are absolutely necessary to the successful propagation of the pheasant. This bird has a capacious stomach, and requires much nutriment; while its timidity soon causes it to abandon those places which are disturbed. It is fond of acorns, beech mast, the berries of the hawthorn, the seeds of the wild rose, and the tubers of the Jerusalem artichoke. As long as these, and the corn dropped in the harvest, can be procured, the pheasant will do very well. In the spring, it finds abundance of nourishment in the sprouting leaves of young clover; but, from the commencement of the new year till the vernal period, their wild food affords a very scanty supply; and the bird will be exposed to all the evils of the vagrant act, unless you can contrive to keep it at home by an artificial supply of food. Boiled potatoes (which the pheasant prefers much to those in the raw state) and beans are, perhaps, the two most nourishing things that can be offered in the depth of winter. Beans, in the end, are cheaper than all the smaller kinds of grain; because the little birds, which usually swarm at the place where pheasants are fed, cannot swallow them; and, if you conceal the beans under yew or holly bushes, or under the lower branches of the spruce fir tree, they will be out of the way of the rooks and ringdoves. About two roods of the thousand-headed cabbage are a most valuable acquisition to the pheasant preserve. You sow a few ounces of seed in April, and transplant the young plants, two feet asunder, in the month of June. By the time that the harvest is all in, these cabbages will afford a most excellent aliment to the pheasants,

and are particularly serviceable when the ground is deeply covered with snow. I often think that pheasants are unintentionally destroyed by farmers during the autumnal seedtime. They have a custom of steeping the wheat in arsenic water. This must be injurious to birds which pick up the corn remaining on the surface of the mould. I sometimes find pheasants, at this period, dead in the plantations, and now and then take them up, weak and languid, and quite unable to fly.

I will mention, here, a little robbery by the pheasants, which has entirely deprived me of a gratification I used formerly to experience in an evening's saunter down the vale. They have completely exterminated the grasshoppers. For the last fourteen years I have not once heard the voice of this merry summer charmer in the park.

In order to render useless all attempts of the nocturnal poacher to destroy the pheasants, it is absolutely necessary that a place of security should be formed. I know of no position more appropriate than a piece of level ground, at the bottom of a hill, bordered by a gentle stream. About three acres of this, sowed with whins, and surrounded by a holly fence, to keep the cattle out, would be the very thing. In the centre of it, for the space of one acre, there ought to be planted spruce fir trees, about fourteen feet asunder. Next to the larch, this species of tree is generally preferred by the pheasants for their roosting place, and it is quite impossible that the poachers can shoot them in these trees. Moreover, magpies and jays will always resort to them at night-fall; and they never fail to give the alarm, on the first appearance of an enemy. Many a time has the magpie been of essential service to me, in a night excursion after poachers. If there be no park wall, an eye ought to be kept, from time to time, on the neighbouring hedges. Poachers are apt to set horse-hair snares in them; and these villanous nooses give the pheasants apoplexy. Six or seven dozen of wooden pheasants, nailed on the branches of trees, in the surrounding woods, cause unutterable vexation and loss of ammunition to these amateurs of nocturnal plunder. Small clumps of hollies, and yew trees with holly hedges round them, are of infinite service, when planted at intervals of 150 yards. To these the pheasants fly, on the sudden approach of danger during the day, and skulk there till the alarm is over. When incubation is going on, the diurnal poachers make great havoc among the pheasant's eggs. They sell sittings of them for five shillings (and sometimes for ten, if the risk in procuring them be great), to gentlemen in towns, who place them under bantam hens. If to these arrangements for protecting pheasants there could be added a park wall from nine to ten feet high, and including about 250 acres, consisting of wood, meadow, pasture, and arable land, the naturalist might put all enemies at defiance, and revel in the enchanting scene afforded by the evolutions of single pairs, and congregated groups of animated nature. Unmolested by packs of hounds, unbroken in upon by idle boys, and unannoyed by stray cattle, and by those going in search of them, his wildfowl would never desert the pool till the day

of migration arrived; and his pheasants (except for the purpose of incubation, and then in no great quantities) would seldom rove beyond the projected enclosure.—*Magazine of Natural History.*

TRIFOLIUM INCARNATUM, OR SCARLET TREFOIL.

COMMUNICATED BY MR. J. JENNER.

This plant has been known in England as an ornamental plant in gardens upwards of forty years, and was introduced by J. Foaker, Esq, Sneading Hall, Kerby, Essex, as food for cattle, in 1826. He procured the seed in Switzerland, and was informed there that it was brought from the Pyrennees, where it was known by the name of trifle-le-rouge, but the Swiss called it trifle farouche, or wild trefoil. Mr. Foaker gave it the name trifolium incarnatum, or scarlet trefoil. This gentleman is convinced that the plant in all its stages as food for cattle is very far superior to tares, and from coming to perfection so much earlier than tares or clover, affords great advantage in fallowing the land or prepaing it for turnips. He observes, that it is generally found sufficiently forward to cut green about the beginning of May; and for fodder (or hay) about a fortnight later; if the crop be intended for seed it will be ready to cut by the latter end of June. When cut green or fed on the land the crop of corn the following year has been improved by it. Having grown it (says Mr. Foaker) on parts of fields, I have had an opportunity of noticing this advantage, but when left for seed I could see but little if any difference. Last year in a field of eleven acres, five were the long fallow, five well manured for turnips, and one of the trifolium for seed: this year the barley nearly equals the long fallow, and is superior to the turnip land. The turnips after manure were worth 50s. per acre—the scarlet trefoil, without any manure, estimating the seed at £3 10s. the bushel, was worth £40.

Mr. Diggens, Coddenham, Suffolk, has this year grown 3½ tons per acre when made into hay: this was sown the second week in September, on a wheat stubble, once scarified and the seed lightly harrowed in. He cut part of the crop green for his horses, and he is certain as green food for them that it is far superior to tares, independent of its producing a greater quantity per acre.

Mr. J. Firmin, Goldenham Hall, Essex, this year cultivated fourteen acres on a barley stubble, once ploughed—a portion of it he cut green for his horses, and he is confident they never did so well on any other description of green food. A portion he cut for fodder (or hay), of which he got about four tons per acre, and the remainder he saved for seed, of which the average was 16½ bushels per acre; he is of opinion it is a most valuable plant in all its stages.

Mr. Vincent, of Lavenham, Suffolk, this year grew about fourteen bushels of seed per acre, and is now feeding his horses on the haulm or straw, that has been thrashed; he never knew them do so well, he is so thoroughly convinced of the value of this plant, that next year he intends to grow it very extensively.

Mr. Peck, of Brockford, Suffolk, this year had about six acres. He fed it late in April, after which he got a most excellent crop of seed; he is of opinion when intended for seed, that it should be fed as late as the latter end of April or the first week in May, by this means it prevents its growing to too great a length and getting laid or fallen. As early feed for sheep, he considers it a most valuable plant, and very far superior to tares.

Mr. Baker, of Birch Hall, Kerby, Essex, sowed four acres of land with a bushel of seed (viz., one peck, or eight quarts per acre) and had an excellent crop of herbage, an acre of which was left for seed, and was cut on the 28th of June, yielding fourteen bushels and three pecks of seed, and thirteen waggon loads from three and a half acres of land. Now, if we suppose the load here mentioned to be the ordinary English "load" of new hay, viz., thirty-six trusses of sixty pounds each, we have as the produce of each English acre, three tons, eleven hundred, three quarters, and fifteen pounds of hay; and this produce was obtained in a year when many farmers did not grow more than one load per acre.

There are many other gentlemen whose names might be mentioned as having grown very excellent crops, and speak as favourably of the plant, but they are so numerous, and the same opinions would be so repeatedly expressed, that it is not considered necessary to adduce further evidence of its utility.

The beginning of September is the most proper time to sow the seed, which should not be less than two pecks per acre. On a wheat or barley stubble, *not* ploughed, the seed drilled or sown, and very lightly harrowed in; but should the land be too hard for the harrows to penetrate, it may be lightly scarified before the seed is sown.

As the slug is a great enemy to this plant, the land cannot possibly be too firm and close, for it is well known that all clovers prefer solid land. In seven cases out of ten, where I have seen one piece or crop better than another, on enquiry I have been informed that the land had not been ploughed for it.

If the autumn be mild and the crop good, it may be fed off by sheep, any time before Christmas, but care must be taken not to turn the sheep on it at the time of a frost, as bruising it at that time would much injure the plant. Rolling it early in the spring much encourages its growth. If intended to be saved for seed, it may be fed as late as the middle of May. As early feed for sheep, or cut green for horses and cows, it is invaluable, and in every instance I have seen it ready for this purpose before tares. The most proper time to cut it for hay or fodder, is just as it is beginning to flower or come into blossom, great care must be taken in making it. It requires two or three days longer under the same circumstances than the common red clover, and when cut for seed the greatest possible care must be taken not to move it too roughly, as the seed, when ripe, is apt to fall out of the seed vessel, and the blossom or head breaks off very easily from the stem. The best time to move it is when the dew is on, either early in the morning or late in the evening. This plant is like all others, the better the soil the greater

probability is there of success in obtaining a good crop, although I have seen most excellent crops on very poor soils. In concluding, it may not perhaps be too much to say, the trifolium incarnatum, or scarlet trefoil, is one of the most valuable plants ever yet introduced to a farmer.

DAIRY HUSBANDRY.

BY MR. WM. AITON.

The dairy, that is, the manufacture of milk into various kinds of improved food, has long been the most profitable branch of husbandry, and neither the demand for, nor the prices of that species of agricultural produce, have declined nearly so much as those of grain, and even less than those of butcher-meat.

Land of medium or inferior quality, when occupied by dairy-stock, and only one-third or one-fourth of it in grain-crop at a time, gives a higher rent, makes a better return, and is far more improved by that mode of farming, than it can be by what is termed liberal rotation courses, or even by grazing, or any other way in which land can be occupied on an extensive scale. Land of medium quality is but ill adapted for perpetual cropping, unless when situated near a large town; and even the richest land requires rest occasionally, to renew its vigour, and to make it produce grain of the best quality. But when land is in pasture as often as it is in crop, and the dung made by a dairy-stock applied to the farm, the soil is gradually meliorated, and the quality of the crops it yields is superior to that of land under constant cropping: and when land is kept too long in pasture, it returns to a state of waste.

It has been stated on the authority of the Board of Agriculture, and upon incontrovertible data, which any farmer or cow-feeder may easily ascertain for his own satisfaction, that the quantity of herbage that will add 112lb. to the weight of an ox, will, when bestowed on a dairy-cow, of ordinary good breed, and in fair condition to yield milk, enable her to yield about 2700 imperial pints of milk. And, as it is well known that, even in Scotland, where milk often contains more serum than that of cows fed on richer pasture; yet, in general, 17 pints of milk will yield an imperial pound of butter; and the butter-milk will sell at 1d. per three pints; and, as 120 pints of that milk will yield from 16lb. to 17lb. avoirdupois, of full milk or Dunlop cheese, it is easy to ascertain whether the 112lb. of beef, or these quantities of butter and butter-milk, or of cheese, will realize the greatest sum. The 2700 pints of milk will yield nearly 385 pounds, or 27½ stones imperial of full milk cheese; and, if made into butter, they will give nearly 157½ pounds, besides the butter-milk, which would amount to about half the quantity of milk churned. The average price of beef, for seven years past, has not exceeded 6s. per English stone; and the 112lb. or 8 stones, of course amounts to £2 8s.; while 27½ stones of cheese, at 5s. per stone, the average price paid by the merchant to the

farmer, during the last seven years, amounts to £6 17s. 6d.; and the average price of 157½ lb. of butter, at 8d. per lb. for the same period, amounts to £5 5s.; and of the butter-milk to £1 17s. 6d. more, or both to £7 2s. 6d.; so that the average price of the cheese exceeds that of the beef to the amount of £4 9s. 6d.; and the butter and butter-milk give £4 14s. 6d. more than the beef produced from the same quantity of food to the cattle.

It is true, that it would cost more labour to produce the quantities of butter and cheese which have been mentioned, and with which I have compared them, than the beef; but should the most ample allowances be made for the dairy labour, fuel, &c. there will still remain an overwhelming balance in favour of the dairy over the feeding system. It may also be noticed, that a dairy-cow can be brought to two and a half years of age, when she may be supposed to produce her first calf, at very little more expense than any other cow of similar size and weight can be reared to the same age, and when she is ready for the grazier. And as the dairy-cow lasts and gives milk for seven years, and is then nearly in as good plight for being fattened as the other, the expense of rearing the one is nearly seven times as much as that of the other, in proportion to the time the two cows last.

The next thing requiring attention of all who wish to study or practice dairy husbandry, is the breed of cows suited to that branch of farming, and the manner in which that species of stock requires to be fed and treated. For it would be folly to expect to render a dairy establishment profitable, unless the cows are not only suited to the purpose, but are also fed and treated in a way to insure a proper return in milk.

Breeding large males with inferior jaded cows, in hopes of improving the breed, is one of the greatest errors that can be committed by a breeder of any species of cattle. It is certainly best to breed from bulls of good shapes, and of a size suited to the cows to which they are put, otherwise their offspring will have large coarse bones, and never will be strong and spirited, in proportion to their size. They will be, in fact, ill-shaped, dull, unhealthy mongrels. The most skilful breeders of dairy-stock in Ayrshire, prefer bulls that have least of a masculine shape, and which have the greatest resemblance to a cow.

The *shapes* that are most approved of in the Ayrshire dairy-stock, are:—*Head* small, but rather long and narrow at the muzzles; the *eye* small, but quick and lively; the *horns* small, clear, bended, and their roots at a considerable distance from each other; *neck* long and slender, tapering towards the head, with little loose skin hanging below; *shoulders* thin; *fore-quarters* light and thin; *hind-quarters* large and capacious; *back* straight, broad behind, and the joints of the chine rather loose and open; *carcass* deep; *pelvis* capacious and wide over the hips, with fleshy buttocks; *tail* long and small; *legs* small and short, with firm joints; *udder* large, broad, and square, stretching forward, and neither fleshy, low hung, nor loose, with large and prominent milk-veins; *teats* short, pointing outwards, and at a considerable distance

from each other; the *skin* thin and loose; *hair* soft and woolly; the head, horns, and parts of least value small, and the general figure compact and well proportioned. It is not to be understood that every dairy-cow, or that any one of them, has all these fine shapes. But these are given merely as the perfection of the breed, or the shapes most desired and sought after.

The *chief qualities* of a dairy-cow are, that she gives a copious draught of milk; that she fattens readily; and turns well out in the shambles. In all these respects combined, the Ayrshire breed excel all others in Scotland, and are probably superior to any in Britain. They certainly yield more milk than any other breed in Europe,—no other breed fatten faster,—and none cut up better in the shambles,—and the fat is more mixed with the lean flesh, or marbled, as the butchers say, than that of any other breed in Britain. They always turn out better than the most skilful grazier or butcher, who are strangers to the breed, could expect on handling them. They are tame, quiet, and feed at ease, without roaming, breaking over fences, or goring each other. They are hardy, and can travel at the rate of from twelve to fifteen miles a day; and they are not injured, but rather improved, by lying out all night during summer and harvest. From their peaceable habits, and the desire they always show to eat, some have imagined that they are dull and grovelling animals, but they are as lively and spirited as could be wished; and they are seldom affected with disease.

It was not by the charms wrought by the introduction of a dozen or two stranger cows, and a bull or two from England, or from any other country, that the whole race of cattle in three counties have been changed from the worst in the arable districts of Scotland, to the best in Britain. That extraordinary change has been effected in one life-time, chiefly, or rather almost entirely, by bettering the condition of the cattle—by better feeding and treatment, aided by judicious crossing, chiefly from the same race of animals. Better feeding and management, with reasonable attention to breeding, will raise any race of cows, from the worst to among the best; while crossing ever so much with strange blood, or even a complete change of the stock, will do no good, unless they are well fed when young, and when grown up—when giving milk, or when dry. This has been proved to a demonstration, in the improvement of the Ayrshire breed; and the same thing will happen wherever the conditions of the stock is uniformly improved by better feeding and treatment.

Farm-stock have long suffered for want of a supply of salt. The high duty on that necessary of the life of mankind and animals long operated as a prohibition to its use among cattle; but even now, when it is removed, many farmers do not avail themselves of the relief. They do not consider that all the domesticated animals have as strong a desire for salt as they themselves feel; and that it acts as a condiment to animals, as well as to the human race. Salt promotes digestion, and improves the pile of horses and cows. The superior quality of the

wool of Spanish sheep proceeds chiefly from their being daily supplied with salt. Wild animals run many miles to get a tasting of the salt-springs, when they are within reach; and it is in their neighbourhood that they are the most successfully waylaid and killed. It is not only bad management to deprive cattle of salt, which does them so much good, but it is even cruel to refuse them what they so much desire.

There is a great diversity in the milk of cows, which is increased by many circumstances—as the age of the cow—the condition she is in—the nearness to or distance from her calving—and, above all, from the manner in which she is fed. It frequently happens, that, of cows not only of the same breed, but even those which are the offspring of the same parents, fed on the same farm, and in the same manner, the one will yield more milk than the others. Too young or too old cows give less milk than those of middle age. A lean cow never gives so much milk as one in good condition. Cows generally give more milk for a few weeks after they have calved than they do at any other time. The food with which they are fed has a powerful influence on the milking properties of all cows; and the mode in which they are reared has a considerable effect on their milking property. A cow reared on bad pasture and scanty subsistence, will never turn out so good a milker as one reared on better pasture. From these and other circumstances, it is not easy to determine the average quantity of milk given by the dairy-cows.—*Quarterly Journal of Agriculture.*

In addition to the foregoing particulars on dairy husbandry, we quote from *Baxter's Library of Agricultural and Horticultural Knowledge*, the following summary directions :—

Choose young and promising cows; though the first cost may appear high, if they prove good milkers, they are the cheapest. 'In this, as in everything else, the word cheap is a deception, unless the quality be taken into view.'

Supply them with ample quantities of nutritious food, and keep them, both winter and summer, in good condition, for milk is always of more value than the best food, however expensive. When cows are suffered to become lean, and that in the winter season, it is impossible that they can ever be brought to afford a large quantity of milk by getting them into perfect condition in the summer months. When cows are lean at the period of calving, no management afterwards is ever capable of bringing them to afford, for that season, anything near the proportion of milk they would have done if they had been supported in proper condition during the winter. The value of food is in proportion to the quantity of nutritive matter it contains. Obtain, therefore, such as may support the cow in good condition, while it increases the quantity of her produce. Let the several meals during the day be varied as much as possible—a change of food exciting the appetite, and tending greatly to increase the quantity of milk.

Give no more at one time than is likely to be consumed at such feeding.

Let the hours of feeding and milking be regular. Regularity is indispensable in dairy management; and here it will be conducive to the health and improvement of the cow.

Cows should be milked three times a day in the height of the season; by attending to this, a much greater quantity of milk is obtained, the cow is relieved, and disease often prevented. Many persons maintain that the same cow will afford an equal quantity at each milking, if it be repeated three times in twenty-four hours, as if it were done only twice. The cow should, however, be well fed when this is carried to any extent.

Wash such roots and other succulent food as may require it, and carefully remove rotten and decayed parts of vegetables. Cleanliness in this case promotes the health of the cow, improves the quality of milk and butter, and is a part of economy.

The curry-comb has been found beneficial; and at the times of milking should by no means be neglected.

Let there be a constant supply of pure water. Dr. Anderson says, He knew a man who made his fortune by studying things of this nature; and one of his principal discoveries was, the vast importance of having a constant supply of the purest water for cows. Other experienced writers have attached much importance to this fact.

The greatest pains should be taken to milk the cow clean; hence the value of patient and well-tempered milkers, as the cow will not only give her milk more freely, but the owner is in less danger of having a valuable cow spoiled through negligence in the performance of this task.

Let the cow have a small plat to range in, with an open shed for shelter when nature prompts her to seek it. The practice of confining cows entirely to the cow-house cannot be recommended, as there are periods when the open air may be essential to ensure the health of the cow. Nevertheless, in winter, they should be kept warm and comfortable, and not be *compelled* to endure the inclemencies of that season.

The following circumstances are injurious to the quality of cheese:—allowing the cows to get rank or ill-flavoured grass or hay, these conveying a bad flavour to the milk and cheese;—allowing the cows to run and heat themselves;—driving them far to be milked, which makes the milk froth much in milking;—carrying the milk a great distance from the place of milking to the dairy;—and allowing it to remain long after it is milked before it is set with the rennet.

The period that cows should be allowed to go dry before calving, has not been determined on,—some allowing two months, while others contend that they be milked up to the period of calving. It appears that no precise time can be fixed on. 'When the milk becomes brackish,' *then* is, perhaps, the most proper season for this to take place. This may happen earlier or later to the same cow in different seasons, owing to causes which cannot be traced. But if nature, by changing the quality of the milk, indicates when that event is about

to take place, it is all we want to know, and may be taken for a rule to direct us as regards this disputed point in the management of dairy-cows.

These are the principal points to which the attention of the dairy-farmer ought to be directed. If it be asked why we have not given some hints to those who still prefer the old method of cow-keeping, our answer is, that we have none other to offer. Every improvement in dairy-cattle appears comprised in the soiling system. The saving of land, and the means of assisting its fertility,—the economy of its produce, and the superior quality of the food produced,—the health of the cow, and her increase in value,—are objects that can be attained only to a very limited extent by any other means.

CHARCOAL FOR DRAINING.

The large silver medal of the Society of Arts has been voted to Mr. T. Johnston, Glasgow, for his proposed use of charcoal as a material for draining. Mr. Johnston proposes to substitute for the materials usually employed in filling drains—namely, brushwood, broom, gorse, or heath—the very same substances, only after they have been charred; as being lighter, more porous, and hardly susceptible of decay. This suggestion, it is believed, is quite new; and though no attempts to reduce it to practice have been made by Mr. Johnston, yet all known facts and analogies are strongly in its favour.—*Arcana of Science.*

ON THE POINTS BY WHICH LIVE STOCK ARE JUDGED.

BY MR. JAMES DICKSON.

Were an ox of fine symmetry and high condition placed before a person not a judge of live stock, his opinion of its excellencies would be derived from a very limited view, and consequently from only a few of its qualities. He might observe and admire the beautiful outline of its figure, for that might strike the most casual observer. He might be pleased with the tint of its colours, the plumpness of its body, and the smoothness and glossiness of its skin. He might be even delighted with the gentle and complacent expression of its countenance. All these properties he might judge of by the eye alone. On touching the animal with the hand, he could feel the softness of its body, occasioned by the fatness of the flesh. But no man, not a judge, could rightly criticise the properties of an ox further. He could not possibly discover, without tuition, those properties which had chiefly conduced to produce the high condition in which he saw the ox. He would hardly believe that a judge can ascertain, merely by the eye, from its general aspect, whether the ox were in good or bad health,—from the colour of its skin, whether it were of a pure or cross breed;—from the expression of its countenance, whether it were a quiet feeder;—and from the nature of its flesh, whether it had arrived at maturity or not. The discoveries made by the hand of a judge might even stagger his belief. He could scarcely conceive that that hand can feel a hidden property,—

the touch—which of all tests is the most surely indicative of fine quality of flesh, and of disposition to fatten. It can feel whether that flesh is of the most valuable kind; and it can foretel the probable abundance of fat in the interior of the carcass. In short, a judge alone can discriminate between the relative values of the different points or appreciate the aggregate values of all the points of an ox. The parts of the ox by which it is judged are called "*points.*"

We have thus seen that a person even totally ignorant of cattle may judge of some of the most apparent properties or points of a *fat* ox; but were a *lean* ox placed before him, he would be quite at a loss what opinion to pass on its present, and far more of its future, condition. The outline of its figure would to him appear rugged and angular, and consequently coarse. To him the body would feel a number of hard bones, covered with a tough skin and coarse hair. A judge, on the other hand, can at once discover the good or the bad points of a lean as well as of a fat ox; because the properties of the former are the same in kind, though not in degree, as those of the latter; and, in accordance with the qualities of these points, he can anticipate the future condition of the lean ox, save and excepting the effects of accidents and disease.

But, it may be asked, if a judge of cattle is a character so easily attained as is here represented, how is it that the opinion of a judge is always held in deference, and is always referred to in cases of difference of opinion? This question admits of a very satisfactory answer. Errors in the judging of cattle arise not so frequently from not knowing the points to be judged of, as from judges allowing one or more of their favourite points the power of too great an influence over the future increasing condition of the ox; and as long as there are so many points to be considered, and as most of them may be partially altered by local circumstances, a difference of opinion may exist among judges of lean stock.

Now, what are those *points* of an ox, a thorough knowledge of which is so essential to constitute a perfect judge? Could they be described and illustrated with such precision, as that they may be applied at once to every ox, in whatever condition it may be, a great advancement would be made towards establishing fixed rules for the right judging of all the domestic animals. Fortunately for the suppression of human dogmatism on this subject, Nature herself has furnished rules for ascertaining points for judgment, which can only be discovered by long and constant practice. Nevertheless, I shall endeavour to describe them plainly, and after pursuing the description, I hope my readers will perceive that they are established laws of nature; and are therefore unerring, and applicable to every species of cattle. Like other phenomena of nature, a knowledge of them can be acquired by observation. This knowledge is the most difficult which the farmer has to acquire, inasmuch as the management of live-stock is a much more difficult branch of husbandry than the cultivation of corn. And although the importance of this knowledge is admitted by every experienced farmer, and a desire for its acquirement is strongly felt by every young one, it is remarkable that very little is said in professed works

on agriculture on those rules which guide us in judging of fat or lean live-stock.

The first *point* to be ascertained in examining an ox is the *purity* of its breed, whatever that breed may be. The ascertainment of the purity of the breed will give the degree of the disposition to fatten in the individuals of that breed. The purity of the breed may be ascertained from several marks. The colour or colours of the skin of a pure breed of cattle, whatever those colours are, are always definite. The colour of the bald skin on the nose, and around the eyes, in a pure breed, is always definite, and without spots. This last is an essential *point*. When horns exist, they should be smooth, small, tapering, and sharp-pointed, long or short, according to the breed, and of a white colour throughout in some breeds, and tipped with black in others. The shape of the horn is a less essential point than the colour.

Applying these marks on the different breeds in Scotland as illustrations of the points which we have been considering, we have the definite colours of white and red in the Short-horns. The colour is either entirely white or entirely red, or the one or the other predominates in their mixture. The skin on the nose and around the eyes is uniformly of a rich cream-colour. The Ayrshire breed in its purity is also distinguished by the red and white colour of the skin, but always mixed, and the mixture consists of spots of greater or smaller size, not blended together. The colour of the skin on the nose and around the eyes is not definite, but generally black, or cream-coloured. In other points, those two celebrated breeds differ from one another more than in the characters which I have just described. In the West Highland, Angus, and Galloway breeds, the colour of the skin is mostly black in the animals of the purest blood, although red, dun, and brindled colours, are occasionally to be seen among them. The black colour of the skin of the nose and around the eyes is indicative of the pure blood of black-coloured cattle, but a cream-coloured nose may frequently be observed among the other colours of skin. It would perhaps be hazardous to assert, in the case of the West Highlanders, that the characters above given are the only true indications of the pure breed, for their origin cannot now be certainly determined; but the characters given will certainly apply to the purity of the blood in the Short-horn and Ayrshire breeds.

The second *point* to be ascertained in an ox is the form of its carcass. It is found, the nearer the section of the carcass of a fat ox, taken longitudinally vertical, transversely vertical, and horizontally, approaches to the figure of a parallelogram, the greater quantity of flesh will it carry within the same measurement. That the carcass may fill up the parallelogram as well as its rounded form is capable of filling up a right-angled figure, it should possess the following configuration: —The back should be straight from the top of the shoulder to the tail. The tail should fall perpendicularly from the line of the back. The buttocks and twist should be well filled out. The brisket should project to a line dropped from the middle of the neck. The belly should

be straight longitudinally, and round laterally, and filled at the flanks. The ribs should be round, and should project horizontally, and at right angles to the back. The hooks should be wide and flat; and the rump, from the tail to the hooks, should also be flat and well filled. The quarter, from the itch-bone to the hook, should be long. The loin-bones should be long, broad, and flat, and well filled; but the space betwixt the hooks and the short-ribs should be rather short, and well arched over with a thickness of beef between the hooks. A long hollow from the hooks to the short-ribs indicates a weak constitution, and an indifferent thriver. From the loin to the shoulder-blade should be nearly of one breadth, and from thence it should taper a little to the front of the shoulder. The neck-vein should be well filled forward, to complete the line from the neck to the brisket. The covering on the shoulder-blade should be as full out as the buttocks. The middle-ribs should be well filled, to complete the line from the shoulders to the buttocks along the projection of the outside of the ribs.

These constitute all the *points* which are essential to a *fat* ox, and which it is the business of the judge to know, and by which he must anticipate whether the lean one, when fed, would realize. The remaining points are more applicable in judging of a lean than a fat ox.

The first of the *points* in judging of a *lean* ox, is the nature of the *bone*. A round thick bone indicates both a slow feeder, and an inferior description of flesh. A flat bone, when seen on a side view, and narrow, when viewed either from behind or before the animal, indicates the opposite properties of a round bone. The whole bones in the carcass should bear a small proportion in bulk and weight to the flesh, the bones being only required as a support to the flesh. The texture of the bone should be small-grained and hard. The bones of the head should be fine and clean, and only covered with skin and muscle, and not with lumps of fat and flesh, which always gives a heavy-headed dull appearance to an ox. The fore-arm and hock should also be clean and full of muscle, to endure travelling. Large joints indicate bad feeders. The neck of an ox should be, contrary to that of the sheep, small from the back of the head to the middle of the neck. The reason of the difference, in this respect, betwixt the ox and the sheep is, that the state of the neck of the ox has no effect on the strength of the spine.

A full, clear, and prominent eye is another *point* to be considered; because it is a nice indication of good breeding. It is always attendant on fine bone. The expression of the eye is an excellent index of many properties in the ox. A dull heavy eye certainly indicates a slow feeder. A rolling eye, showing much white, is expressive of a restless capricious disposition, which is incompatible with quiet feeding. A calm, complacent expression of eye and face is strongly indicative of a sweet and patient disposition, and, of course, kindly feeding. The eye is frequently a faithful index of the state of the health. A cheerful clear eye accompanies good health; a constantly dull one proves the probable existence of some internal lingering disease.

The dulness of eye, arising from the effect of internal disease, is, however, quite different in character from a natural or constitutional phlegmatic dulness.

The state of the skin is the next *point* to be ascertained. The skin affords what is technically and emphatically called the *touch*—a criterion second to none in judging of the feeding properties of an ox. The touch may be good or bad, fine or harsh, or, as it is often termed, hard or mellow. A thick firm skin, which is generally covered with a thick set, hard, short hair, always touches hard, and indicates a bad feeder. A thin, meagre, papery skin, covered with thin silky hair, being the opposite of the one just described, does not, however, afford a good touch. Such a skin is indicative of weakness of constitution, though of good feeding properties. A perfect touch will be found with a thick, loose skin, floating, as it were, on a layer of soft fat, yielding to the least pressure, and springing back towards the fingers like a piece of soft, thick chamois leather, and covered with thick, glossy, soft hair. Such a collection of hair looks rich and beautiful, and seems warm and comfortable to the animal. It is not unlike a bed of fine soft moss, and hence such a skin is frequently styled "mossy." The sensation derived from feeling a fine touch is pleasurable, and even delightful, to an amateur of breeding. You cannot help liking the animal that possesses a fine touch. Along with it is generally associated a fine symmetrical form. A knowledge of touch can only be acquired by long practice; but, after having acquired it, it is of itself a sufficient means of judging of the feeding qualities of the ox; because, when present, the properties of symmetrical form, fine bone, sweet disposition, and purity of blood, are the general accompaniments.

These are the essential *points* of judging *lean* cattle; but there are other and important considerations which must claim the attention of the judge, in forming a thorough judgment of the ox.

The *proportion* which the extremities bear to the body, and to one another, is one of these considerations. The head of the ox should be small, and set on the neck as if it appeared to be easily carried by the animal. This consideration is of great importance in shewing cattle to advantage in the market. The face should be long from the eyes to the point of the nose. No face can be *handsome* without this feature. The skull should be broad across the eyes, and only contract a little above them, but should taper considerably below them to the nose. The muzzle should be fine and small, and the nostrils capacious. The crown of the head should be flat and strong, and the horns should protrude horizontally from both sides of it, though the direction of the growth from the middle to the tip varies in the different breeds. The ears should be large, stand a little erect, and so thin as to reflect the bright sunlight through them. The neck should be light, tapering from the front of the shoulder and neck-vein, with a gradual rise from the top of the shoulder to the head. The length of the neck should be in proportion to the other parts of the animal; but this is a non-essen-

tial point, though I would prefer an apparently short neck to a long one, because it is generally well covered with the neck vein. A droop of the neck, from the top of the shoulder to the head, indicates a weakness of constitution, arising frequently from breeding too near akin. The legs below the knee should be rather short than long, and clean made. They should be placed where they apparently bear the weight of the body most easily, and they should stand wide asunder. The tail should be rather thick than otherwise, as thickness indicates a strong spine and a good weigher. It should be provided with a large tuft of long hair.

The *position* of the *flesh* on the carcass is another great consideration in judging of the ox, the flesh on the different parts of the ox being of various qualities. That part called the spare-rib in Edinburgh, and the fore and middle ribs in London, the loins, and the rump or hookbone, are of the finest quality, and are generally used for roasts and steaks. Consequently the ox which carries the largest quantity of beef on these *points* is the most valuable. Flesh of fine quality is actually of a finer texture in the fibre than coarse flesh. It also contains fat in the tissue between the fibres. This arrangement of the fat and lean gives a richness and delicacy to the flesh. The other parts, though not all of the same quality, are used for salting and making soups, and do not fetch so high a price as the parts just described.

A full twist lining the division between the hams, called the "closing," with a thick layer of fat, a thick flank, and a full neck-vein, are generally indicative of tallow in the interior of the carcass; but it frequently happens, that all these symptoms of laying on internal fat fail. The disposition to lay on internal fat altogether depends on the nature of the individual constitution; for, it is often observed, that those individuals which exhibit great fattening *points* on the exterior, do not fill with internal fat so well as others which want these points. On the contrary, thin made oxen, with flat ribs, and large bellies, very frequently produce large quantities of internal fat.

The first part which shews the fat in a feeding ox, is the point or top of the rump, which, in high-bred animals, is a prominent point; sometimes it protrudes too much, as the mass of *fat* laid on these is out of proportion to the *lean*, and therefore useless to the consumer. This is the part which frequently misleads young or inexperienced judges in the true fatness of the ox, because fat may be felt on this part, when it is very deficient on most of the other points.

The parts, on the other hand, which are generally the last in being covered with flesh, are the point of the shoulder-joint, and the top of the shoulder. If these parts are, therefore, felt to be well covered, the other and better parts of the animal may be considered ripe. Ripeness of condition, however, can only be rightly ascertained by handling, for there is a great difference between the *apparent* and *real* fatness of an ox. The flesh of an apparently fat ox to the eye, may, on being handled by a judge, feel loose and flabby; but a truly fat ox always feels "hard fat." With such the butcher is seldom deceived, while loose handlers give no assurance of killing well.

It is proper, in judging of the weight of a fat ox, to view his gait while walking towards you, which will, if the ox has been well fed, be accompanied with a heavy rolling tread on the ground. In this way a judge can at once come very near to its weight.

The application of all these rules and considerations to the judging of *lean* stock, constitutes the chief difficulty to the judge. An ox, in high condition, in so far as its condition alone is under consideration, can be judged of, as we have seen, by any one; and sometimes the fatness may be so great as obviously to deform the symmetry to any observer. The superiority of a judge to others, in these cases, consists in estimating the weight, observing the purity of the blood, and valuing the points of the animal. But in judging of a lean ox, its future condition and symmetry must be foreseen. The rules which I have attempted to describe, will, if studied practically, enable an inquiring observer to foresee these points; and in judging between a number of valuable points, it should be remembered, that purity of breeding will always insure aptitude to fatten, which, in its turn, will insure the largest remuneration for the food consumed.

Sheep, both fat and lean, may be judged of by nearly the same rules. The purity of breeding will be seen in the large full prominent eyes, the clean thin bone of the head and legs, and the large thin pricked up ears, set on each side of the top of the head, and in the short, thick, smooth, clear hair of the face and legs. The section of the form of the fat sheep is even more mathematically like a parallelogram than that of the fat ox. The touch of the skin is also the same in kind, and is as sure an indication of the disposition to fatten as in the ox. In regard that wool varies so greatly in the many breeds of sheep, I can only make this general remark on the fleece best suited to every breed, namely, the whole body should be well covered with wool, with the exception of the face and legs, which are always covered with hair. A large covering of wool not only protects them against the inclemencies of the weather, and the coldness and dampness of the ground, but it supplies a large fleece to be disposed of to the wool buyer. One deviation from the rules of judging cattle must be made while judging sheep, to which I have already alluded, namely, while the neck of the ox should be thin, that of the sheep should be thick; because a thin necked sheep is found to possess a weak spine, and is generally a bad feeder. A thin neck has thus the same effects on sheep that a small tail has on cattle. As in cattle, a drooping neck in sheep indicates a weakness of constitution, arising from breeding in and in.

Some of the rules for cattle and sheep are applicable to swine. Swine should have broad straight backs, round ribs, thin hair, thin skin, small tails, short and fine muscles, pricked ears, small and fine bones, and round and well turned shoulders and hams.

In conclusion, it is obvious that these rules for judging live stock, are not founded upon arbitrary assumptions. Had no *natural* means of judging existed, man could no doubt have contrived rules to suit his own convenience; and in such a case, he would probably have chosen such

as he could have most easily applied; but unless they could be applied to the *growing*, as well as the *mature* condition of animals, they would be of little value. But we have seen that natural means of judging *do* exist, and although they cannot be easily understood without much observation and practice, yet, by practice, they can be acquired, and easily applied to the existing circumstances of the animal, whatever these may be. Any person, it is true, cannot at once perceive their necessary tendency is to lead to a correct judgment. Long and careful personal observation is requisite to convince the mind of their value in that respect. Tuition, without practical observation cannot of itself do it. It has been the study of nature, in short, which has enabled man to establish these rules for his guidance; and as all the operations of nature are regulated by general laws, these rules must be of universal application. It is clearly established by observation, as an uniform principle of judgment, that when an ox, in a growing state, presents a certain degree of purity of breeding, a certain form of body, and a certain kind of handling of its skin, a certain result is undeviatingly exhibited in the mature state from these given premonitory symptoms. Should this result conduce to the acquisition of wealth, we are anxious to possess the growing animal which exhibits such favourable points; and, on the other hand, we are as anxious to avoid the possession of that animal which exhibits unfavourable points, unless at a very depreciated value. Now, it has been ascertained by experience, that pure breeding, perfect form, and fine touch, make the best mature animal. Hence *these points* will insure both the growing and the mature animal a ready market and a good price; and hence also, that breed which constantly presents these points, deserves, by its intrinsic worth, to be generally cultivated.—*Journal of Agriculture.*

THEORY OF FALLOWING.

BY THE AUTHOR OF THE DOMESTIC GARDENER'S MANUAL.

The terms *fallow—fallowing*, are of doubtful derivation; therefore, whether we trace them with the learned N. Bailey, (whose dictionary, by-the-bye, may be mentioned with reverence, as one of the surest guides to Etymology)—to the Saxon term '*falewe*'—"a deer color, palish red, like a brick half burnt,"—in as much as applies to *fallow color*—and in this Dr. Johnson accords:—or to *fealga—a harrow*—"because fitted by twice ploughing for the more easy use—a land laid up, or that is left untilled for some time"—or finally to the Arabic word 'falaha'—signifying ploughing, on the authority of an excellent practical writer in "*the Library of Agricultural and Horticultural Knowledge.*"—Edit. iii. p. 191.

There is nothing repugnant to good sense or probability in these references, but the want of precise accordance, proves that authorities seem fated to differ; so it is in all things connected with science, philosophy, and history in general. Sound unerring truth, facts which cannot be impugned, and deductions, which admit not of doubt, can

be found only in the operation of figures; *they* alone bring conviction, and lead to conclusions upon which the mind may repose with perfect confidence.

The *theory, or science of fallowing* is, I am sorry to say, involved in a maze of contradictory notions; but this is to view the evil in it's most favourable point: for difficulties surround the enquirer into causes, at every step he takes. In my endeavour then to throw some light upon so involved a subject, I think that I cannot err if I take a summary view of the opinions, that have been, and are entertained thereon, and the arguments by which they are supported. I shall not attempt to inquire into the practice of the ancients; for our authorities are vague and their notions involved in superstition; however, I may just observe, in passing, that, *fallowing* in Christian countries, may, perhaps, in the first instance, have had a religious origin. As the Jews were commanded to let the land enjoy her "Sabbaths"—the countries where the sacred books were read, while they no longer considered the Jewish ordinances as religious obligations—might still lean to a practice which once was founded upon Divine precept, and therefore think it reasonable to let the land repose, and recover *itself* from its supposed state of exhaustion.

In this state, real or imaginary, we discern one of the reasons which, from time immemorial, have been assigned for the adoption of the fallow; and therefore, it is needful to enquire whether it have any foundation in fact. It is, and ever has been natural, to suppose that, a plant, a tree for instance, growing on a certain spot of ground, must suck up, and thus deprive that spot of, its nutritive juices; and observation has confirmed the conjecture, at least to a certain extent. But the question,—what are nutritious fluids? still remains to be decided. I will relate a fact which is now before me, that cannot fail to bear upon the enquiry, or at least to induce reflection. I, this spring sowed two plots of Indian corn, (*Zea mays*), with every attention to enrichment of the soil, so as to secure all the nutriment that tillage, and good ground could afford. One plot was in the garden; (the seeds were sown in rows, in soil over manured trenches, like those of celery; the earth was, naturally, a hazel, sandy loam, that, four years ago, formed the third spit below the surface, and brought up by trenching two feet deep. The croppings had been unintermitted. Broccoli, celery, potatoes, cabbage, &c., had been successively borne; yet as the manurings had not been profuse, the soil retained its original color not very much deepened by carbonaceous matter. Espalier apple trees grow upon one side of the plot, currant and gooseberry shrubs, on the other, and strawberry plants upon both. I mention these particulars to render the comparison complete.

The other plot was made in an orchard divided from the garden merely by a rail-fence; it, in fact, stands in a direct line with the former, and might be said to be in the same piece of ground, about fifty yards only, distant from it, in a right line, were it not for the fence. Still, however, the soil might vary, and so it does, in as

much, as, though the ground in both plots was equally trenched, *in the latter* the top spit was *retained* at the surface; and from that surface the grass turf was pared off prior to the act of trenching. I digged the soil,—formed manured trenches,—sowed the seeds,—and when the plants advanced, manured the intermediate spaces, incorporated the soil with the dung, and earthed the plants with this compost: in the first named plôt the plants were earthed up by soil digged out of a central trench, into which manure was then put, and immediately worked into the soil. Thus, though the management was somewhat different, the earth of both plots was carefully and sufficiently enriched. But the growth and condition of the two sets of plants are at this time, different beyond imagination. In the garden-plot they are of a most luxuriant character, though, not a drop of water has been given throughout the late parching season: the plants stand erect, from four to six feet high, the stems are robust, the leaves of a deep rich green; the ears verging to maturity. In the orchard, numbers of plants are scarcely a foot high, the growth of all is irregular, the verdure pallid, and the entire plantation is all but a failure, parched with drought and withering away. What is the reason of this perplexing difference? At one edge of the plot, by the side of a ditch, stands a row of young *acacia trees*, seedlings raised four years since, but now vigorous young trees, from eight to twelve feet high. These, have roots which traverse the *surface* of the soil horizontally, to an amazing extent; and as the ditch proved an insurmountable obstacle to their advance on one side, the roots have penetrated the soil in the opposite direction; and have reached the extreme boundary of the plot of Indian corn. The consequences I have already described; but the *cause* I discovered by digging the spaces intermediate between the rows: every spit of earth I brought up was netted with the young fibres of the acacias, which were immediately recognised, not only by their color, but by the strong and peculiar odur of stick-liquorice which they emitted. These roots, or rather their spongeoles, had imbibed all the aqueous particles, and thus had left the soil void of water. Perhaps, I may have some reason to suppose that the exudations from the roots of the trees are specifically poisonous to the Zea, because I observe that ranks of potatoes situated with respect to the acacias, precisely on corresponding ground, are comparatively green, and flourishing; but yet, the soil was found to be so arid, parched even to dustiness, that it could not maintain vegetation in a plant so succulent in its natural habit, and which, be it observed, sends out its broad, fleshy roots and spongelets—not deeply as does the potatoe, and most other garden vegetables,—but very near to the surface, and therefore on a level with, and among, the myriads of tough fibrous radicles of the acacias.

From these facts, interesting themselves, I argue that, what may be considered an *exhaustion of the soil*, is frequently nothing more than an abstraction of its due proportion of water. Look at a plant in a pot, particularly one which parts with abundance of perspirable matter from

its breathing pores (*stomata* of the leaves.) See how it droops, perhaps three times in the day, if water be not liberally given; and how speedily it recovers if re-supplied in due time! Would any one say that its soil was exhausted? Certainly not. The soil, in fact, as in the instance of my plot of corn, might be abundantly rich; it might, as that was, be top-dressed after the first developments of vegetation; and be a third time supplied with manure; and yet shrink for want of that fluid element, which (say vegetable anatomists what they may) approaches so nearly to, as to appear identical with the ascending, *absorbed* sap.

I need not much enlarge upon this head, but content myself by remarking that, as far as I have observed facts and analogies, it appears that, every individual vegetable yields substances to the soil, which tend to manure it for *other* vegetables; therefore that a crop never exhausts (impoverishes) the ground in the proper acceptation of the term. That it absorbs moisture, there can be no doubt; and in this way trees act most energetically: hence, independently of the effects which refer to the subject now alluded to, we may safely conclude that, the cropping of fruit-tree borders is a wise and justifiable practice, in as far as respects the trees; for a green crop will enrich the soil. But the trees will render the soil dry, and thus the vegetables grown in the immediate vicinity of their roots may be very materially injured.

The foregoing observations may appear a digression; but if they be maturely considered it will be obvious that they bear upon the enquiry, whether the land is, or is not *exhausted* by crops; and if so, they cannot be irrelevant.

I come now to the second consideration, that indeed which is the actuating motive of almost every landlord and tenant in requiring, and giving, a fallow to a portion of the land, yearly—*the extermination and destruction of weeds.*

On this point, there are abundant sources of difference of opinion; one man argues that weeds are not inimical to crops, and he therefore, is far from being solicitous to exterminate them: I go a good way with him, on the ground that, all green, all herbaceous crops, while in the vigor of their growth, really manure the soil; but then, it ought to be considered that, weeds are the sturdy natives of the soil; many of them are climbers, as for instance, *bear-bind*, or *withewind*, (*convolvulus arvensis*,) these grow with great rapidity, and send their powerful roots,—which abound with elastic coils,—deep into the earth: others are so prolific either in effects, or by seeds, that no foreign crop could contest with them the possession of the soil; and even in the garden, were fallow is seldom, if ever thought of, weeds can scarcely be subdued. In the field, under the most regular drill culture, hands could not be employed in sufficient numbers, to arrest the rapid progress of many native species; hence, time and space must be set apart for the express object of keeping the ground sufficiently clean to admit of proper tillage. I conversed on the subject very recently with a friend, who is by practice, intimately conversant with farming in Worcestershire, Lancashire, and Berkshire: he occupies one of the

finest medium farms in the latter county, in my vicinity; and with the general character of the soil I am tolerably well acquainted. It is a binding, but sandy loam, of a pale hazel color; contains about 130 parts out of 200, of coarsish, gravelly sand, capable of being separated by merely washing off the *fine matters;* these contain much siliceous earth,—about 5 per cent. of chalk,—a good deal of ochrous iron, and 2 or 3 per cent. of alumen or pure clay: the soil is strongly adhesive (after being wet), when dried by the sun; the clods are hard, but break up with the first shower. Such a soil is harsh and gritty, it wants that unctuous (fatty) quality which some loams possess; and hence, turnips, and green crops struggle before they gain proper hold: where this however, is obtained, they push on with great vigor. The land in question, is *fallowed* only for turnips; that is, the wheat stubble is ploughed in as early as possible, particularly in a season of drought like the present, if the work be practicable; subsequently, it undergoes cross-ploughing two or three times, is harrowed, and sown with turnips late in the spring; thus the fallowing extends to the period of about nine months, and includes the winter. A cleaner state of land cannot readily be discovered than is that of the farm above alluded to, and of those around it.

I do not pretend to argue whether the above mode of proceeding be the proper one, or the best that could be adopted; the object is to state what really *is* the practice; and in order to discover the opinion of the farmers on the actual utility of fallowing, I put the following questions to my friend. On what motive do you fallow? Setting the destruction of weeds entirely aside, do you consider that the ground requires rest; or that it contains any matters within it, which could prove injurious, or poisonous to a crop, were it not subjected to that exposure to sun and air which a fallow affords it? The answer was direct,—" We fallow because we cannot clean the ground otherwise; the land *is* poisoned; or in an unfit state for a *repetition* of some crops, but there is no cause whatever to suppose that it is poor or exhausted; nor is the fallow ever adopted with a view to expose it to the sun and air, otherwise than as they tend, with the cross ploughings, to cleanse it from couch and other weeds.

Here then is precisely the ground upon which the theory of fallowing is now based; and the opinion expressed above, brings me to the *third point* of consideration.

The *theory of rotation of crops,* first promulgated abroad by Professor De Candolle, has been ingeniously, and plausibly laid hold of in order to erect a new hypothesis of fallowing. The operations of ploughing and cross-ploughing, by turning and exposing fresh surfaces of the soil to the action of the air and sun, particularly during the summer, tend " *to decompose and remove by evaporation, the excrementitious matter thrown into the soil by previous crops.*"

They who can turn to page 545, of the *Library of Agricultural Knowledge,* (Edit. iii) will perceive an extract from the *Domestic Gardener's Manual,* wherein the principles of rotation of crops—founded

upon the supposition of excremetitious depositions in the soil, are distinctly laid down. That passage was written above six years since, when, I believe, the theory was scarcely known, as it had not been printed in any *English* work of authority. As the comparison of facts, resulting from direct observations had led me to the conclusion, which I at that period arrived at; and in which I am confirmed by the writings of learned men that I have subsequently perused,—I am not likely to relinquish the hypothesis of radical exudation; but I do most unequivocally assert that, I view that theory as, the interpreter of the philosophy of *rotation of crops* only, and not as bearing in any degree upon the operations of *fallowing*.

In the garden we never fallow; crop succeeds to crop, more or less regularly, according to the science of the gardener, and the capabilities of the soil; and weeds are kept under by the employment of a sufficient number of hands, or they are prevented from seeding, and overwhelming the crops. It is proved by the luxuriance of the vegetables in the gardens of laborers, that weeds are not *impoverishers*: they are indeed unsightly things, and were they permitted to advance unchecked, would surmount or strangle the foreign crops of the garden, or those improved natives which we style, garden-vegetables. It is in vain to argue in support of fallow that exposure to sun and air is the *sine qua non*;—and, equally so, to assert that rotation croppings will not suffice to cleanse it: the garden furnishes irrefragible evidence to the contrary—evidence which can neither be subverted, nor smothered. The farm indeed, may require a fallow, and I am not prepared, nor do I desire, to deny the fact; for I am convinced that hands could not be employed to keep it in due condition; and it is possible, even on the hypothesis of exudation, that the usual *rotations* are not comprehensive enough, and therefore inadequate to the purpose of cleansing the land entirely. In other words the crops of the farm are few in number; and as the cœreal or white crops are not dissimilar in their physical structure, the few intermediate *green* plants may not be sufficient to remove the fecal matters deposited by those crops. On this consideration, and on it alone (purely theoretical as it is)—can I cede to the opinion that exposure of surfaces may act remedially in removing, by evaporation, or chemical action those substances, which a more extensive range of croppings would effectually absorb. Four or five plants may fail to act efficiently, in as much as three of the number are not dissimilar, and are suffered to mature their seeds, being *the chief grain crops* of the farm; whereas a rotation of eight or ten different species, half of them being green, succulent herbs, might prove amply sufficient to restore the soil, and render the farm an extensive and perfect garden. We may not perhaps be permitted to witness so great an improvement; but in the general introduction of that estimable plant, *trifolium incarnatum*, I perceive an auxiliary of considerable promise.

It has been proved, and I believe is admitted, that, there are lands which do not require, and never are submitted to fallowing.

Mr. Main has written a very able and argumentative paper upon the

subject, in the *Quarterly Journal of Agriculture*, (No. 26, for Sept. 1834); and at page 244, thus distinctly describes the mode of treating, and cropping lands of a description which never require fallow. "In the neighbourhood of Herne Bay, in the County of Kent, the nature of the soil is such that drilled beans and wheat constantly succeed each other. The only departure from this course is sowing the fields in rotation with grass and clover seeds, to be again broken up at the end of the second year. The hoe constantly exercised among the drilled beans, keeps the land free from weeds, thus answering one principal object of fallow, and rendering such an expensive and barren process unnecessary." Again—

"In the parish of Burnham, in Buckinghamshire, the land is a fine level tract of rich, alluvial, *easily-worked loam*. Being in the neighbourhood of Windsor, and densely populous, rents are high; consequently, the farmers are loath to lose even a single year's crop. But instead of fallowing to clear the land from root-weeds, crowds of women and children are employed in hand-picking, after every operation of the plough and harrows, as well as in careful weeding during the early growth of the crop. By these labours, summer fallowing is never had recourse to; the farmers finding that the expenses of hand-picking and weeding, though heavy, are much less than the loss of a crop would be from such productive land."

Mr. Main observes that, on a turnip land farm a year's fallow is seldom necessary; and he proceeds to state a practice which accords sufficiently with that described in the early part of this article on "fallowing for turnips." "But," he adds, "if the land by reason of natural adhesiveness, *cannot be reduced* by aeration in the early part of the year, the fallowing is, and must be, continued throughout the summer, during which time the clods are reduced, the weeds are killed or harrowed out, and with the addition of a good coat of dress, the soil is prepared to sustain another course of crops, till it again becomes so foul with root-weeds, that another fallow becomes necessary."

Here then is the sum and substance of the reasons for adopting the fallow; a process of expediency, dependent solely upon the nature of the soil: if that be light, and can be easily and effectually cleaned from weeds, there will be no cause in the world to lose time, and a crop in the bargain; but if it be clayey and binding, so much so as to preclude winter and spring operations, the fallow must be adopted; and simply, because it cannot be avoided.

Deep ploughing, and cross ploughings during the summer—thus exposing fresh surfaces to the action of solar power, are productive of loss of energy, inasmuch as the air admitted within the soil tends to decompose the manuring substance therein, and to produce aqueous and carbonic gases which are dispelled in vapor. It is upon this principle of the operation of atmospheric air within the soil that we can account for the great benefit which plants receive from a deep stirring of the ground. People are apt to say that *water is raised* by digging the ground in a garden between rows of plants in dry weather; whereas the truth

is,—the manuring substances which lie inert under a hard-bound surface, are brought into contact with an agent of great power—the air—much of which is buried by the spade and the hoe, and immediately acts upon the decomposable substances about it. In this case the vital principle of the plant aids the operation, and seizes the fluids or gaseous products in their nascent state: the consequences are immediately apparent; the sickly hue of the plant changes to a full and dark green, growth is resumed, and the vegetable flourishes. But if no crop be on the ground, as is the case in fallow-land; the nutritive gases escape and are lost; and this famous process of bleaching and cleansing, becomes, in reality, one of deterioration and loss. As to the "*bleaching*," the idea is more fanciful than judicious: every one knows that in proportion as ground becomes dry, it loses color; but that if it be wetted by rain, or by pouring a little water upon it, the brown or deep tint is restored: some carbonaceous matters may however be lost by long exposure to light, but this abstraction is not to be regarded as the just object of the fallow: it is a loss—a waste, to which a farmer must submit, if his land be of a texture to require that operation.

The fallacy of supposing that land gains in quality and vegetative powers by exposure to sun, air and frost, cannot be more effectually exposed than it is, by the effects which attend close cropping. The soil under turf is of the best and purest quality: the gardener selects it for his fruit-borders; the turf itself for his choicest plants in pots. Clover enriches, mellows, and meleorates ground in respect of texture as well as quality. Exposure, on the contrary impoverishes: it is an operation of destruction, one by which the hardiest weeds are subdued: the texture of the soil, it is true may, for a time, be rendered more open and lighter; but no improvement in quality is effected. All the mass of evidence which can be collected, appears to me to prove beyond a doubt that, where that *cleanness of ground* which is essential to the safety of a farm or garden crop can be attained, a fallow ought never to be given. As however all must depend upon the nature of the soil and the force of hands employed upon it, fallowing must no doubt be occasionally persisted in, and always, on some sorts of heavy land. I am not to subvert a practice, which may be expedient; I only desire to place the subject before the reader in its true light, and to guard against the promulgation of error and the adoption of fallacious opinions.

THE SOUTH DOWN BREED OF SHEEP.

Believing that a short history of this breed, of which our county may be truly proud, will be acceptable to our readers, we have taken some pains in enquiring into the subject, and trust that the results of our enquiries may be as interesting as we know them to be accurate. We at once state that we have received our information from the present John Ellman, Esq., of Glynde, who has kindly favoured us with extracts from the books of his highly respected father, which will shew what can be accomplished by the intelligence and perseverance

of a single individual. When we reflect that, fifty years ago, the South Down breed of sheep was not known on the other side of London, and that now they are spread not only over every part of England, but also of Scotland and Ireland, and that, go where they will, they stand their ground, it is only matter of surprise that it should have been reserved for the late Mr. Ellman, to be the instrument of disseminating this useful breed over the whole kingdom.

The first South Down ram that was ever sold for ten guineas, was sold in the year 1787, to Lord Waldgrave, in Essex, by Mr. Ellman, when he sold two to his Lordship for £21. The year previous, the celebrated Arthur Young bought eighty ewes of Mr. Ellman, at 18s. each, which were sent into Suffolk. In the year 1789, Mr. Ramsden, from Nottinghamshire, bought forty ewes of Mr. Ellman, at 25s. each. In the same year, Mr. Boys, of Betshanger, in East Kent, bought a ram of Mr. Ellman, at eight guineas. In 1789, Mr. Macro, from Norfolk, bought of Mr. Ellman, one hundred and seventy ewes, at 23s. In 1790, Mr. Crowe, of Norfolk, bought forty ewes of Mr. Ellman, at 26s., and a ram at twelve guineas. In 1791, Mr. Boys gave Mr. Ellman £1 11s. 6d. each for sixty-six ewes, and from this year may we date the rapid introduction of the South Down sheep into Norfolk, under the auspices of that eminent agriculturist, Thomas William Coke, Esq. Mr. Ellman having been at Holkham the previous year, and having seen the Norfolk breed of sheep, a breed more remarkable for their activity than for any thing else, suggested to Mr. Coke his having a few South Downs, in order to give them a trial; to this the great encourager of improvement immediately assented, and, as Mr. Ellman's own ewes were all sold, he bought five hundred ewes and lambs from the best flocks in Sussex, and sent them to Holkham, with four rams of his own, for which Mr. Coke gave him 70 guineas. In 1793, Mr. Coke gave Mr. Ellman 35s. each for eighty ewes. In 1794, that patriotic nobleman, The Earl of Egremont, of whom this County may be justly proud, gave Mr. Ellman two guineas each for fifty ewes. Indeed, to the friendship of this excellent man, with which Mr. Ellman was honoured to the close of life, was he mainly indebted to the late Francis Duke of Bedford, the present Duke of Norfolk, and other noblemen and gentlemen, who visited Glynde, and were the means of introducing the South Downs into different counties. The first ram Mr. Ellman ever sold for 50 guineas, was in 1796, to Mr. Goodenough, in Dorsetshire. From that time, for many years, there was a regular demand for all the rams Mr. Ellman could supply, at prices varying from 20 to 100 guineas, for the season. In 1802 and 1803, Francis Duke of Bedford gave him 300 guineas for the use of a ram for the two seasons, which was the highest price Mr. Ellman ever let a ram for. We have omitted to mention, that in 1800, Mr. Ellman sold two hundred ewes to the same nobleman for 500 guineas. The price at which Mr. Ellman sold his draft ewes soon rose to three guineas each, and eventually to four guineas, at which he contracted for the sale of the whole to one person, George Talbot, Esq., of Glou-

cestershire, for four years. It must be obvious, that the prices for which Mr. Ellman sold his sheep would soon be shared by those flock masters on the Downs, who took pains to improve their flocks, and for many years two guineas each was considered a fair price for the old ewes of the best flocks. We have thus traced the introduction of the South Downs to many counties in England. In 1800, Mr. Ellman sent two rams to the Northumberland Society. In 1801, Mr. Ellman sent the first South Down sheep to Ireland, for Owen Wynn, Esq., in the county of Sligo, and to Mr. Latouche, in Dublin. In 1803, Mr. Ellman sent the first South Down sheep into Scotland, for Sir John Riddell, Bart. Mr. Ellman also had the honor of sending some, by order of his Majesty, to Russia, as a present to the Emperor. The present Mr. John Ellman has also sent, within these two years, some to New South Wales, Portugal, America, and the West Indies; and it is extraordinary, that in climates differing so widely, the South Down sheep bear equally well the heat and cold. Well may, therefore, the County of Sussex be proud of seeing her native sheep by their natural hardihood of constitution, assisted by judgment in improving their symmetry, spread so far and wide, and even at this moment standing as high in estimation, if not higher, than any breed of sheep in the kingdom.

We cannot conclude this account without inserting an extract from a letter, received by the present Mr. Ellman, of Glynde, from a gentleman in America, to whom Mr. E. had sent six ewes and a ram.

"The sheep arrived in October, in high beauty and condition, after a five or six weeks' passage, never having suffered in the least from the exposure and hardship consequent on so long a voyage; though, doubtless, very much of their excellent condition is attributable to the great and judicious care of Captain Hebard. From New York they travelled by steam boat to Albany, and thence by waggon to this place. I made a small yard for them, with an open fence, and with a few boards made a temporary shed, entirely open excepting at the back; here they wintered on hay, oats, and a few turnips when the weather would admit of their being eaten before they were frozen too hard. The first snow fell on the 3rd December, on the 14th winter assumed her garment for the season, on the 15th the thermometer fell to 12° below zero of Farenheit, since which, up to the present time, (March 16, 1835,) these sheep have been littered with straw *over ice and snow.* On the 3rd of January, the mercury fell to 12° below zero, on the 7th to 27° below zero, our coldest day, still the sheep never suffered in the least from the intensity of the weather; for nearly half this month, the thermometer, at sun rise, was in the vicinity of zero; and on the 3rd of February was again at zero, and another very cold month followed. On the 23rd of this month (February) with the thermometer at 32°, one of the ewes lambed, each succeeding day added another lamb, until the 27th, when the fifth lamb came, the thermometer as low as 4°, still they all did well, and seemed *entirely* regardless of the cold, though the mercury stood the following days thus:—

March 1st, at 2° below zero	March 6th, at 4° above zero
—— 2nd, at —— zero	—— 7th, at 18° —— zero
—— 3rd, at —— zero	—— 8th, } not marked
—— 4th, at 6° below zero	—— 9th, }
—— 5th, at 4° below zero	—— 10th, at 32° above zero, this day

the last ewe lambed, and they are all in fine health, and the ewes are all flush of milk. I think such hardihood and vigour of constitution needs no cross from any other blood."

SEED WHEAT.

Three years ago Colonel Le Couteur, one of the Deputies from the island of Jersey, became acquainted with Professor La Gasca, one of the most celebrated botanists in Europe, who had been Curator of the Royal Gardens at Madrid, and obliged to leave Spain, where he is again restored to his friends, and to his former situation.

The Professor was then growing about 80 sorts of wheat in the garden of Mr. Saunders, nurseryman in Jersey. Their variety, classification, and beauty, struck Mr Le Couteur, who sought to acquire all the information he could from Professor La Gasca. The latter told him that for the last twenty-five years he had been employed in studying the properties and character of wheat, and had collected in the Royal Gardens upwards of nine hundred varieties and sub-varieties.

He came to Col. Le Couteur's farm, and picked out more than twenty sorts out of three fields, then (in August) growing; and gave daily all the instruction and information wanted by Mr. Le Couteur, who resolved on profiting by such an opportunity, and began seriously to cultivate the important plant of wheat, so as to procure the several sorts distinct from each other, and keep notes of the experiments made on the culture, produce, weight of the grain, and qualities of the corn, flour, and straw.

Colonel Le Couteur has kept a most minute account of his experiments, and taken the greatest care to preserve the best sorts and in their purity. He has in London nineteen varieties of the greatest beauty, and such as the frequenters of Mark-lane say could not be matched in England for purity. They consist in,

No.		No.	
1.	White compact. Tremois, or Spring Wheat.	10.	Long eared Liver-coloured.
2.	Red Tremois, or ditto.	11.	Red compact.
3.	Long-eared ditto.	12.	Golden.
4.	Dantzic.—Winter Wheats. Triticum Hybernum.	13.	Kœleri Compactum Belvuensis.
5.	Small round ditto.	14.	Cesariensis.
6.	White Seedling. Coturianum Hybernum.	15.	(No. 6. c.)
7.	Kœleri Loturianum.	16.	Red ear (white Grain or Sark Wheat.)
8.	Kœleri Red.	17.	Red compact. (No. 9.)
9.	Kœleri White.	18.	Kœleri (sub-yellow.)
		19.	(No. 11.)

The Colonel, after three year's experience, has arrived at this conclusion, that the proper cultivation of wheat is yet unknown or unpractised.

That it is of consequence to keep the several sorts to grow apart, because they all ripen at different periods; and that bread made of ripe and unripe corn could neither be so wholesome or nutritious as when made of ripe corn, without the mixture of that which had not well ripened.

That each sort requires, or will thrive best in, a particular soil and situation adapted to each.

That one ear of a superior variety, sowed grain by grain and suffered to tiller apart, produced four pounds nine ounces of wheat.

Whereas, another ear of an inferior sort, treated in the same manner, produced only one pound thirteen ounces.

Hence it is of importance to select the sorts that are the most farinaceous and productive.

That by sowing each sort apart they might be easier saved and harvested in rotation, some sorts ripening a fortnight before the others.

The same quantity of wheat of a farinaceous kind may maintain a family of fifteen persons twelve months; where the same quantity of another kind, though apparently fine corn, will maintain them only nine months.

From the superior soil and climate of the Channel Islands, Col. Le Couteur thinks that, by growing none but the best kinds and keeping them perfectly true and pure, the Islands might be made to produce the most approved seed corn for Great Britain.

The Islands might thus become of the greatest benefit to the United Kingdom, and can never be objects of jealousy, as to the fear of large importations from them, since the extent of all the land susceptible of cultivation in all the Channel Islands together does not exceed 25,000 acres, and that the greater part must necessarily be occupied by the meadows, orchards, and vegetable gardens of all sorts, absolutely necessary for a population of more than sixty thousand inhabitants.—*Farmer's Magazine.*

PREDICTIONS OF THE WEATHER.

There is nothing more common than to predict the future state of the season, from some single appearance in the early part of it; and yet there is nothing more unphilosophical or fallacious. An early blossom, an early bee, or an early swallow, or any other appearance of nature, is no evidence whatever of the kind of weather that is to come, though the belief that it is so is both very general and very obstinate. The appearance of these things is the effect of the weather, not the cause; and it is what we may call an external effect; that is, it does not enter into the chain of causation. The weather of to-day must always have some influence on the weather of to-morrow; but its effects will not be

altered in the smallest tittle, whether it does or does not call out of the cranny in which it has been hybernated, some wasp, or some swallow that was too weak for the autumnal migration. Birds, blossoms, and butterflies, do not come in expectation of fine weather; if they did, the early ones would show that they see not far into futurity, for they generally come forth only to be destroyed. They come in consequence of the good weather that precedes their appearance; and they know no more of the future than a stone does. Man knows of to-morrow only as a rational being; and were it not that he reasons from experience and analogy, he would have no ground for saying that the sun of to-day is to set. The early leaf and the early blossom of this spring may be a consequence of the fine weather of last autumn, which ripened the wood, or forwarded the bud; and the early insect may be evidence that the winter has been mild: but not one of these, or any thing connected with plants or animals, taken in itself, throws light upon one moment of the future; and for once to suppose that it does, is to reverse the order and cause of effect, and put an end to all philosophy: to all common sense. And are we to draw no conclusions from the phenomena of plants and animals, which have been popular prognostics of the weather from time immemorial; not from the face-washing of the cat, or the late roosting of the rook, which have been signs infallible time out of mind? No, not a jot from the conduct of the animals themselves; unless we admit that cats and crows have the keeping and commanding of the weather. These actions of theirs, and very many (perhaps all) phenomena of plants and animals, are produced by certain existing states of the weather; and it is for man to apply his observation, and find out by what other states these are followed. The cat does not wash her face because it is to rain to-morrow; that, in the first place, would be "throwing philosophy to the cats;" and, in the next place, it would be doing so to marvellously little purpose, inasmuch as, if puss were thus informed of the future, she would only have to wait a day in order to get a complete washing without any labour or trouble. When the cat performs the operation alluded to, it is a proof that the present state of the atmosphere affects her skin in a way that is disagreeable, and the washing is her mode of relief; and, in as far as the cat is concerned, that is an end to the matter. Man, however, may take it up, and if he finds that in all cases, this happens only before rain, he is warranted in concluding that the state of the atmosphere, which impresses this action upon the cat, is also the state which precedes rain; and that in the cases where the rain does not follow, there has been a sudden atmospheric change, which is also worthy of his study. What it is in this case, and whether connected with the little action in the fur of the animal, by which electricity can be excited, we shall inquire: but in the late roostings of the crows (rooks) the cause is apparent, they feed upon larvæ and earth worms; these, especially the latter, come most abroad in the evenings before rain; and, as most animals gorge themselves where food is easily found, there is no reason why rooks should not follow

the general law. These familiar instances have been noticed in order to point out how apt we are to miss the lesson that nature would give, and break down the fabric of philosophy, by giving a purpose and a prescience of the future to that which cannot reason. The appearance and first songs of birds are, like all other seasonal phenomena, part of the history of the year, and of value retrospectively in telling what has been, though not of the smallest use in telling what is to be.—*Time's Telescope.*

WOOL.

The chief difference in wool consists in the length, and fineness, of its filaments. That which has the finest filaments is reserved for the fine cloths. The most beautiful European wools are those of Spain and Saxony. The breed of Merino, or fine-woolled Spanish Sheep, has been introduced into this country, and found to retain the excellent qualities of the fleece. New South Wales, and probably the whole of Australia, will produce as fine wool as any in Europe. Wool, either in a raw or manufactured state, has always been the principal of the staple articles of this country. It was before the time of Edward III. always exported raw, the art of working it into cloth and dying being so imperfectly known, that persons above the degree of working people could not go dressed in cloth of English manufacture. It has been customary in this country to divide wool into two great classes—long and short wools; and these again into subordinate classes, according to the fineness of the fibre. The fineness of the hair or fibre can rarely be estimated, at least for any useful purpose, except by the wool-sorter or dealer, accustomed by long habit to discern those minute differences that are quite inappreciable by common observers. In sorting wools there are frequently eight or ten different species in a single fleece; and if the best wool of one fleece be not equal to the finest sort, it is thrown to a still lower sort, of an equal degree of fineness with it. Sheep that produce the finest wool are kept lean, and yield 1½lb. each. If they be better kept, they grow large and produce more wool, but of an inferior quality. Messrs. Luccock and Hubbard estimated the Sheep's Wool produced in England, in 1800, at 193,475 packs short, and 131,794 packs long, wool; and, in 1828, at 120,655 packs short, and 263,847 packs long, wool. In 1830 the imports from Germany amounted to 26,073,882lbs; those from Australia, to 1,967,309lbs; and those from Spain, to 1,643,515lbs. The first steps taken to encourage the manufacture of woollen cloths was by Edward III. who procured workmen from the Netherlands. Before that time the Continental adage was "the stranger buys of Englishmen the skin of the fox for a groat, and sells him the tail again for a shilling." This manufacture is supposed to have been pretty equally distributed over the country in its commencement. In 1614 the medley or mixed cloth, for which Gloucestershire is still famous was fabricated; towards the end of the 17th century, Mr. G. King and Mr. Davenant, estimated the value of the wool shorn in England at

2,000,000*l*. a year; and they supposed that its value was quadrupled in the manufacture; of which about 2,000,000*l*. were exported. In 1700 and 1701, the official value of the woollens exported amounted to about 3,000,000*l*. a year. At an average of the six years ending with 1789, the annual official value was 3, 544,160*l*. The extraordinary increase of the cotton manufacture soon after 1780, no doubt contributed powerfully to check its progress. In 1802, the official value of the exports rose to 7,321,012*l*., being the largest amount they have ever reached. In 1812, they sunk to 4,376,470*l*. During the three years ending with 1800, the official and the declared or real values of the woollen manufactures exported from the United Kingdom have been

	1828	1829	1830
Official value	£5,728,969	£5,372,409	£5,558,790
Declared or real value.	£5,125,284	£4,661,259	£4,850,184

Macardy's Commercial Cyclopædia.

BONES.

Bones, although of comparatively late introduction as manure, have occupied much of the farmer's attention within these few years. They have indeed been used in some parts of England for a long time, and have been extensively imported from the Continent into the town of Hull, where several machines have been erected either for grinding them into powder, or bruising them into small pieces; which modes of application have been found so advantageous, that they have, within the last twenty years, excited general attention, and are now in almost universal use as the principal manure for raising turnip crops on the calcareous soils in Yorkshire and Lincolnshire.

Bone dust is the fittest state in which to lay it upon grass, for it will not only take more immediate effect upon the crop, but if laid in pieces, it would interrupt the progress of the scythe. It should, however, be recollected, that fine powder can only be obtained from spent bone which has undergone the process of manufacture. It is therefore spread, as a top-dressing, by hand; but it is also very commonly laid in the drills for turnips, for which purpose many ingenious machines have been contrived for sowing it along with the seed. It is, however, much to be regretted that these implements cannot be constructed with more simplicity, for their cost is so considerable, that unless a man has a very large quantity of land to drill, their purchase would be imprudent, and the hire is generally unreasonably expensive.

Regarding the *quantity of dust*, the powdered bones are dearer than those which are merely broken small, and although said to be more forcing to the first crop, on account of their being, when in the state of powder, more intimately blended with the soil, and more directly applied to the seed, yet they are not so durable as when they are laid on in pieces; but it is also true that, in the former case, they are not

laid on so largely, for the amount depends entirely on the size of the bones. They have been applied, in the rough state, to the extent of 100 bushels per acre; but the average quantity, of all sizes, is stated, in the Doncaster Report, to be 39 bushels. When the smaller bones are distinguished from the larger, they, however, seldom appear to exceed 30 bushels per acre, and in many cases do not arrive at 20: perhaps it may be assumed, as the most general practice, that half-inch bones are employed at the rate of 25 to 30, and dust at 20 bushels per acre; but a distinction should be also drawn between the quantity of those which are applied after being manufactured, and those which are laid on in a raw state.

The *size of the pieces to which the bones should be broken* is also an object of some importance, as the smaller they are the more prompt will be their effect: on which the following observation has been made by one of the correspondents of the Doncaster Association:—"That if he meant to till for early profit, and if he wished to keep his land in good heart, he would use half-inch bones; and, in breaking these, he should prefer some remaining considerably larger:" the reason assigned for which is,—"that by using bones of a large size, with dust in them, there must be sufficient of the small particles of the dust to set the turnip-crop forward, and sufficient of the large particles of the bone left to maintain the land in good condition for the last crop."

Respecting their durability, it has been affirmed, that the effect will not be increased if they be laid on to a great amount; for the same produce has been obtained from the comparative application of 50 and 100 bushels; and an experiment has been tried by varying the quantity on different ridges of a large extent of ground under turnips, at the rate of 28, 40, and larger quantities alternately, without creating any visible difference in the crop. This, however, may be perfectly correct, so far as regards one or two crops, for it has been found that, when used in large quantities, they have rendered the land extraordinary productive during a great length of time, of which we find the following instances in the Doncaster Report:—

> 1. On a field, part of which was boned forty years ago, the crops were, on that part, during fifteen or sixteen succeeding years, visibly better than the remainder, although the land was all of the same quality, and the part not boned was manured with farm-yard dung.
>
> 2. In another case, about three acres of light sandy land were dressed, in 1814, with 150 bushels of bones per acre; since which time the land is said to have never forgotten it, but is nearly as good again as the other part, farmed precisely in the same way, with the exception of the one application of bones.

We learn, also, from experiments at Kew, that although they yield a certain supply of nourishment to plants the moment they are capable of receiving it, yet that is done so gradually as to furnish only a regular and moderate supply: reasoning upon which, it is to be presumed, that as a large quantity does not produce the effect of forcing

a crop in proportion to the amount supplied, neither can it be so soon exhausted by the gradual consumption of the smaller quantity. This application may therefore be perfectly consistent with good husbandry, if applied to any amount, however large; though, as regards the farmer's purse, the expenditure of the outlay is a different question. The extent of their fertilizing quality is greater upon grass-land, under cattle, than upon arable. Valuers estimate the allowance to a quitting tenant by supposing the effect of bones upon tillage and meadow-ground to be exhausted within four years; but on grass-land depastured it is considered to last during eight.

Experience seems to be in favour of laying the manure in *drills*, especially when applied to turnips, although the superiority of the *broadcast practice* is maintained by some very intelligent farmers, who hold—that the turnip plant receives its support principally from the fibres which it throws out sideways, to a much greater length than people will believe, and derives more nourishment from them than the tap-root; and that the bones being dispersed, the fibres are more likely to meet with them than when they are accumulated round a tap-root, and that method must be best which occasions the greater quantity of nourishment to be conveyed to the body of the turnip. In drilling the bones, there is also a difficulty found in the after-ploughing, of mixing them with the soil; and although this may be in some measure obviated by cross-ploughing the ridges, yet that portion of the land on which the manure is thus laid receives more than an equal degree of benefit. A third mode is however acted upon by others, who sow them broadcast, and gather them into ridges with a mould-plough.

The *time for laying them upon the land*, when applied to grass, whether natural or artificial, is generally recommended to be early in the spring; but if upon meadow, the growth of which has been fed off, then the moment the cattle are removed. Experience, however, varies upon this point; because it has been found to depend materially upon the season and the state of the land, which, if wet, will be more benefitted by delaying the operation until the weather becomes warm and the ground dry.

When applied in the drills of arable land, they are of course deposited along with the seed; but when spread broadcast, then they are not uncommonly either harrowed in immediately previous to the sowing, or with the last ploughing; though, when used in a fresh state, without having been subjected to the process of manufacture, they should always be laid in sufficiently long before the sowing, to allow them time to ferment, or they will not take immediate effect upon the rising crop.

The *soils to which they are best adapted* are those of a light and warm nature; for on wet and cold grounds they have rarely been found to produce any sensible benefit. Their power of contributing to lighten strong land, by their mechanical action upon the soil, and thus rendering it less adhesive, has indeed been vaunted, and, if laid on to a very

large amount, there can be no doubt that the bones, in pieces, would have some such effect; but the smallness of the quantity in which they are usually applied renders their force for that purpose quite insignificant.

On *heavy loams and clays*, the accounts of their operation have been almost invariably unfavourable; and it may be laid down as a necessary qualification in a soil fit for the application of bones, that it should be dry. This, indeed, has been contradicted by experiments stated in the Doncaster Report, upon what is described as a wet sand soil, with an irony-coloured subsoil, upon which two quarters per acre were drilled, and produced an excellent crop, when manure had been previously tried without effect. This, however, having occurred in the years 1826 and 1827, which were unusually dry, may serve to explain the fact, without affecting the principle that bone manure is not generally beneficial to clay lands.

The same Report states, that "*upon very thin sandy land*, the value of bone-manure is not to be estimated; it is not only found to benefit the particular crop to which it is applied, but extends through the whole course of crops; and even in the succeeding courses, its effects are visible in the improved quality of the land, and the efficiency of a smaller quantity than would at first have insured a crop. Upon much of the high land about Babworth, which is a light sandy soil, the crops under ordinary farm management were comparatively unproductive; but since the introduction of bones, after having been dressed for several fallows with sixty or seventy bushels per acre, they have not only become productive, but so much improved in quality as to return an equal crop with a much lighter dressing of manure or bones throughout the next course."

"On the *dry limestones* near Doncaster, the same favourable results have been obtained; and no failures, beyond those attributable to peculiarity of season, are noticed."

On the *Wolds of Yorkshire and Lincolnshire*, it also appears, by the testimony of several extensive farmers, that "before bones were generally used with turnip-seed, many thousand acres were annually sown for that crop without any manure whatever, from the impossibility of getting fold-manure for more than one-third or fourth of their fallows. The turnips upon such unmanured land were consequently very indifferent; and the benefit of sheep feeding upon their tops—for of bottoms they seldom had any—was very trifling. Since the use of bones has, however, become general, the turnip crop has been, in many instances, ten-fold, and in few less than four or five-fold its former bulk. All the succeeding crops of grain and seeds have been amazingly increased, and, upon the four or five-shift system, there is no doubt the land will go on progressively improving, requiring a less quantity of bones annually, from its increased fertility and power."

On *light loams*, the returns to the Doncaster Committee give bones a preference to farm-yard dung. And we learn that, upon the calcareous soil of the Yorkshire Wolds, heavy crops of turnips have been

raised from 16 bushels per acre of bones, while in the same field, and under similar circumstances, but manured from the farm-yard at the rate of from 8 to 10 tons per acre, the turnips have been of the most inferior description.

On *peat soils*, if previously drained and laid dry, their advantages are reported to be so striking, that from fifteen to twentybushels of dust per acre, drilled, have been also found to very far surpass the ordinary dressing of stable-dung, and even of lime and pidgeons'-dung.

On *gravels*, the reports are meagre and contradictory, though perhaps reconcilable in principle, as it has been justly observed, that "a gravelly soil may embrace every variety of texture and quality, from the light dry sand to the water-logged yellow clay—preserving in each the necessary admixture of stones and grit." To wet gravel, their application has been found decidedly unfavourable.

The fermentation of bone naturally leads to the considerations of the subject of forming *a compost of bones with earth and other substances*, by a mixture with which they soon become decayed and pulverized—a practice which is stated in the Doncaster report to have been recommended by several very intelligent farmers, thirteen of whom, solely from the result of their own experience, describe its effects as superior to those of bones used singly. With some of these, it is the practice to mix 50 bushels of bones with 5 loads of burnt clay, or good earth, per acre; by which dressing, the crops between fallow and fallow, excepting clover, appear to have been increased one-fifth in value. Others use forty bushels of bones, broken from two to three inches, in a compost with five loads of farm-yard manure, and a sufficient quantity of earth, the effect of which has been felt on the wheat crop at the end of the four-course system. Many also mix up dung, soot, rape-dust, and the ashes from weeds and house fires, with the bones, by which great heat, and consequent fermentation, is occasioned.

The most general practice, however, is to form the compost entirely of bones and yard muck, mixed, in various proportions, with

From 50	bushels of bones	to 4 or 5	of dung.
20	do.	4	do.
12	do.	8	do.

This, if the heap be well covered, will no doubt decompose the bones very rapidly, and one person states, "that he has used as much as 35 bushels of bone dust, per acre, without manure, in the same field where he laid six loads of fold manure, and ten bushels of bone dust; but the turnips on the part manured with bone dust alone were not so good as those on the part manured with the compost and the succeeding crops were still worse in comparison."

As the great amount of bones now actually consumed as manure, besides the quantities applied to other purposes, may reasonably excite an apprehension that the still increasing demand will soon exceed the supply and consequently raise the price, a correspondent of the "Quarterly Journal of Agriculture," has suggested the following economical method of employing them, which he has used for the last two years, and by which he states that he has obtained heavy crops of turnips.

He forms a compost, as the manure for one imperial acre, of 8 bushels of coarse bone-dust, with not less than double that quantity of coal-ashes, which may be generally procured for about 5s. per ton. The ashes should be carefully collected in dry weather and placed under cover, in order that they may be kept free of moisture; or, if that be difficult, they may be strewed with a dusting of quick-lime: after which they are to be riddled as small as the dust itself, for otherwise, if sown with a drilling-machine, they will not pass easily through the hopper. The bones are then mixed with the ashes; the mass ferments, and evolves a considerable degree of heat, when they soon become fit for use.

Turnips raised with this compost, he affirms to have always possessed the same characters of a close crop, firm root, and hardiness to resist the rigours of winter, that turnips raised with bone-dust alone evince; in proof of which, he has sold them for 7£. per acre, to be eaten off by sheep. He, however, supposes that it is the bone-dust alone which secures to the crop whatever nourishment may be imparted to it at the future stages of its growth, in which he is doubtless correct; but in imagining that he has thus discovered a more economical mode of their application in their effect upon succeeding crops, we imagine that his further experience will show him that he has been deceived; for although the fermentation of the bones, occasioned by the application of the ashes, may increase their power upon the actual crop, it will be proportionably diminished in those which follow, and we think that the instances which we have already stated must convince practical men that the durability of their influence upon the soil depends on the quantity in which they are applied.

Independently of the decided fertilizing properties of bones, when applied to dry and light soils, they have the great advantage of being procurable at a small expense of carriage, which diminishes the labour of teams to a great extent; for one waggon-load of 100 bushels, broken small, will in most cases be found equal to 40 cart-loads of yard manure. They are also capable of being preserved during a long time, when kept dry, without incurring damage, and thus may be stored up during the winter season, when farm business is not pressing; added to which, they leave the land freer from weeds than when it is manured with dung. This, and their suitableness to the drill husbandry, renders them peculiarly adapted to the cultivation of turnips—to which, indeed, they have been the most universally applied; and we need not remind our readers, that on the success of that crop generally depends those of the whole succeeding course. The instances are also numerous, upon all soils, of turnips being destroyed by the fly when sown in drills, having had the manure placed directly under them; when turnips sown in the same field, and on the same day, with bone-dust, have entirely escaped their ravages. Their value to the holders of light soils, in thus enabling them to procure the certain means of improving the returns from their land, by this increase of their quantity of nutritive manure, may therefore be considered inappreciable. It has been stated as the comparative

result of some experiments, that bone-dust acts in the cultivation of grain, as compared to the best stable manure, in the following proportions:—namely,

In respect to the quality of the corn, as	....	7 to 5
In respect to the quantity, as	....	5 to 4
In respect to the durability of its effects on the soil, as		3 to 2

We cannot indeed agree altogether in this estimate of its powers, but it requires no further arguments to press its application upon the attention of every farmer, who is in possession of ground to which it is suitable. We shall, therefore, only add the following summary of the rules for its application, as recommended by the members of the Doncaster Agricultural Association, from which it appears—

That on dry sands, limestone, chalk, light loams, and peat, bones are a very highly valuable manure.

That they may be applied to grass with great good effect.

That on arable lands, they may be laid on fallow for turnips, or used for any of the subsequent crops.

That the best method of using them, when broad-cast, is previously to mix them up in a compost with earth, dung, or other manures, and let them lie to ferment.

That if used alone, they may either be drilled with the seed, or sown broadcast.

That bones which have undergone the process of fermentation are decidedly superior (in their immediate effects) to those which have not done so.

That the quantity should be about 20 bushels of dust, or 40 bushels of large, increasing the quantity if the land be impoverished: and also, according to our opinion, if the bones have been already manufactured.

That upon clays and heavy loams, it does not yet appear that bones will answer.

On this latter observation, however, a farmer near Nantwich, in Cheshire, remarks, that he "occupies a farm in the township of Pickmore, the soil of which is a clay loam, scarcely twelve inches deep, the sub-soil a grey sand, mixed with coarse clay—which the farmers call *rammel*—on a bed of good clay marl. Two years ago, he covered the field with bone-manure; previous to which the grass was so sour, as not to be worth ten shillings per acre; but it is now full of most excellent herbage, consisting of white clover and trefoil;" to which he adds, that "in another of his fields, with a clay soil, a small portion of it was manured, thirty-two years ago, by a former tenant, with bones; and that, although it has been twenty years in tillage, yet that part still shows a superiority over the rest."

ON THE BRITISH PLANT-LICE, PARTICULARLY THOSE WHICH ARE DESTRUCTIVE TO FIELD AND GARDEN CROPS.

BY JAMES RENNIE, A M., PROFESSOR OF ZOOLOGY IN THE KING'S COLLEGE, LONDON.

Though plant-lice (*Aphides*) are, in these temperate climates, next to the locusts of warm climates in their destructiveness to growing crops, yet is a knowledge of their history but very imperfectly diffused, both among many professed naturalists, and among most farmers and gardeners, who annually suffer considerable losses by their depredations. The fact can scarcely be credited, that, notwithstanding the thousands (I might perhaps say millions) of money which have been lost to hop-growers, and to the national revenue derived from the duty on hops, occasioned by the ravages of the hop-fly (*Aphis Humuli*), I can discover no published figures nor description of this insect in any work in any language, either scientific or practical. The very name is omitted in the most extensive scientific catalogues of British insects; while the bean-dolphin or collier (*A. Fabæ*), also a very destructive insect of the same genus, though named, is neither figured nor described. These facts are certainly not very creditable to our literature.

In the details, again, which have been published, the most erroneous and unfounded fancies are given with all the authority of facts; and practical men are mystified, and put upon wrong courses of prevention, by those who might have been expected to set them right.

The following endeavour to supply a few of the more important details that may, I trust, be in general relied on, is confessedly in many points very imperfect; but it may stimulate others to make farther inquiries, in order to discover what is still unknown, and to elucidate what is mysterious and obscure, by careful observation. It is my wish to bring together all the facts which lie scattered about in numerous works, both foreign and British, and to add to these such observations as I have myself made respecting these insects;—a task which has not, so far as I am aware, been hitherto attempted in any language, though its utility to every man engaged in cultivating the soil must be very obvious. I shall begin with the general history of Plant-lice, and conclude with such descriptions of the species as I can find recorded in works of science.

Pairing and Reproduction.—With respect to pairing and reproduction, the plant-lice are the most singular animals yet known. M. Reaumur was at first led to believe them to be hermaphrodite, like snails and earth-worms, till M. Bonnet of Geneva in some degree cleared up the difficulty. Upon the leafy branch of a spindle-tree, plunged in a phial of water, and set in a garden-pot, M. Bonnet placed a plant-louse (*Aphis Euonymi*), which he had seen born the instant before of a mother without wings; and having previously examined the leaves and stem with the most minute care, lest there might be any other aphides upon them, he covered the whole with a glass vessel,

the edges of which being plunged into the mould, he felt confident that he had the control of the conduct of his prisoner. This was done on the 20th of May, at five in the evening ; and he continued to watch, with a magnifying-glass, the imprisoned insect, every day, from hour to hour, beginning about five in the morning, and leaving off about nine or ten at night, writing down its every movement. It changed its skin four times, in the same manner as caterpillars, and accomplished its last moult without accident; and at seven o'clock on the evening of the first of June, it gave birth to a young one, and up to the 22d of June inclusive, it produced altogether ninety-five, all alive. The size of the mother became at this period much diminished, and M. Bonnet's subsequent observations were cut off by her escape; but he sent the result of these observations to Reaumur, who read them at a sitting of the Académie des Sciènces at Paris. It produced an extraordinary sensation among those who were interested in such pursuits; and as it was desirable that a deviation so very singular from the common laws of nature should not rest upon individual testimony, however respectable, the experiments and observations were repeated and varied in every possible manner, at the request of the Academy, by a number of the most distinguished naturalists then living, namely, M. Bazin of Strasbourg, MM. Lyonnet and Trembley at the Hague, by M. Bonnet himself at Geneva, and, in fine, by M. Reaumur, who says he would have justly merited reproach if he had neglected to see with his own eyes experiments undertaken at his request.

The Strasbourg naturalist M. Bazin was fortunate in selecting the species which feeds on the poppy, as the young arrive at maturity in seven or eight days, and they are, besides, not apt to ramble far from the spot where they are born. A young aphis of this species accordingly, of which M. Bazin witnessed the birth on the 29th of July, was secluded upon a poppy leaf, and by the 7th of August it had brought forth seven young ones. In similar trials with others of the same species, as well as with the aphis of the rose, the same results followed.

M. Bonnet, stimulated by his discoveries, pushed the investigation still further. He commenced with the magpie aphis of the elder, secluding not only an individual at the moment of its birth, but one of its progeny, and so on successively, till he saw the fifth generation produced without any intermediate pairing; and the young of the latter brood, he had reason to believe, might have been equally fertile, had it not been in the winter, when he could not procure a fresh elder branch for nourishment. In a subsequent experiment with the large species which feeds on the bark of the oak, M. Bonnet carried his observations as far as the ninth generation, which were produced in three months, the males being throughout rigorously excluded from the nurse-boxes in which the females were imprisoned. Lyonnet made similar experiments with the aphides of the willow, but without recording the number of generations produced, his object being to ascertain whether they ever paired at all, like other insects, or whether, as M. Trembley had imagined, they paired before birth. Both Lyon-

net and Bonnet distinctly ascertained that Trembley's notion did not accord with fact, for after a time the fecundity of the females becomes exhausted, and pairing is then as indispensable to render them fertile, as to any other animal. It is very singular, however, that the female after pairing is not viviparous, that is, does not produce living young, but eggs, or, as M. Bonnet was inclined to think, a species of pupæ like eggs; whereas the insects which are thence disclosed produce living young ones without pairing, and, more wonderful still, all these broods are uniformly females, no males being produced till the pairing season, which is towards the close of summer or autumn.

According to M. Kyber, the clove-pink plant-louse (*Aphis Dianthi*) will produce nothing but females for four years in succession, without pairing with any male, provided the individuals be kept in a warm chamber. This also he found both prevented the production of males and the laying of eggs in the autumn, confirming the observation of M. Bonnet, that it was the decrease of temperature which occasioned the laying of eggs as the winter approaches. (*Burmeister, Handbuch der Entom.* 335, who quotes *Germar, Mag. der Entom.* i. 2. 14.)

M. Duvau observed some individuals during seven consecutive months, and obtained eleven generations without pairing. He observed an individual obtained from the ninth generation, from the 29th September till the 19th December. (*Mem. du Museum*, t. xiii.)

Fecundity and rapid Increase.—The double mode of reproduction in the plant-lice, supposed by Dr Darwin to resemble the buds and seeds of trees, will serve to account for the very astonishing increase of these insects. Dr Richardson, in the plant-louse of the rose (*A. Rosæ*), reckons in one season ten generations, each generation averaging 50 individuals, so that, by multiplying 50 nine times by itself, one egg will give origin to the almost incredible number of 25,065,093,750,000,000,000. To this must be added the number of eggs laid by the tenth generation before winter, for the renewal of their progeny the following season. M. Reaumur, however, on the observations of M. Bonnet, reckons 90 for the first generation from a single mother, and reckoning that each of these produces 90 more, the second generation will be 8100; the third will be 729,000; the fourth will be 65,610,000; and the fifth will be 5,904,900,000. The ninth generation in this case would be 350,970,489,000,000,000. That this calculation is founded on the best ascertained facts, appears from the experiments of M. Bonnet to which we have above referred, and he has been so particular as to record the day and hour of the birth of each individual insect. In one of his journals we find 95 plant-lice produced from one mother between the 1st and 21st of June; in another, 90 plant-lice from the 30th May to the 15th June. M. Latreille, a high authority, states the increase at 25 young a-day from the same mother, though, on looking over M. Bonnet's tables, we find the numbers never exceed ten, and are usually from four to six young a-day; so that, supposing the facts relate to the same species, there must be some mistake in M. Latreille's statement.

Even, however, at the lowest estimate, the rate of increase is almost inconceivable, and hence we need not wonder that these insects sometimes appear in such numbers as to obscure the air. "On the 1st of August," says White of Selborne, "about half-an-hour after three in the afternoon, the people of Selborne were surprised by a shower of *Aphides* which fell in these parts. They who were walking the streets at that time found themselves covered with these insects, which settled also on the trees and gardens, and blackened all the vegetables where they alighted. These armies, no doubt, were then in a state of emigration, and shifting their quarters, and might perhaps come from the great hop plantations of Kent and Sussex, the wind being that day at north. They were observed at the same time at Farnham, and all along the vale at Alton." "I remember seeing," says Major, "in this neighbourhood (Leeds), in the month of September, I believe in the year 1829, the species which infests the apple-tree alight in clouds, so as almost to cover every kind of tree or plant they came in contact with."

Growth and Changes.—The growth of insects is somewhat different from that of larger animals, insomuch as the skin of insects never expands; for when the animal within increases in bulk, the skin is burst through and thrown off. In the plant-lice, as in other insects, when first brought into life by being hatched either within or without the body of the mother, the outer skin encloses a succession of several other skins, each becoming more delicate, soft, and indistinct than the one exterior to it, but gradually, like the expanding leaves, growing more substantial and firm as it receives a supply of nutriment. The superfluous nourishment, usually in considerable quantity, and called the *fat* of the insect, appears to lie between the successive skins. But as the first inner skin expands and increases in consistence, the fat which lies between it and the outer skin seems to be absorbed into the body of the insect, and of course swelling it out; while its abstraction from the interior of the outer skin renders this much more dry, separates it from the inner skin, and disposes it to harden and shrivel, while all the internal organs become enlarged by the nutritive fat. The expansion, therefore, of the body of the insect, on the one hand, and the shrinking of the old skin on the other, produce a mutual struggle, which, from the continued operation of the causes, must, it is obvious, be soon brought to a termination. The skin, from losing its internal moisture, loses also a portion of its colour, and becomes obscure and dull; and the insect, from being girt and squeezed by its pressure, begins to turn and twist itself in various directions, to rid itself, if possible, of the inconvenience. By continuing these movements, the creature succeeds at length in rending the old skin at its weakest part, which is usually on the back, just behind the head; and in a few minutes, using its body as a wedge, it may be seen issuing through the breach. The old skin is thus abandoned like a worn shirt, and the insect appears in an entire new dress, the tints of which are at first paler, but become fresher and brighter. The insect, also, in conse-

quence of the quantity of fat which has gone to augment its several parts, becomes all at once so much enlarged in size, that we can with difficulty conceive how it could have been contained in the old skin out of which it had just crept. The cast skin is frequently so very perfect that it might almost be supposed to be the insect itself.

M. Frisch ascertained that most species of plant-lice cast their skins four times before they arrive at full growth. M. Bonnet observed species which moulted only three times. If a plant or tree, accordingly, infested with plant-lice be examined, the leaves will be seen strewed with the cast skins of the insects, of a white colour; and we mention this the more particularly, that some inaccurate observers, overlooking their form, have represented these cast skins as the eggs of the insects. Since the eggs of the plant-louse are hatched within the body of the mother during summer, and the young before birth grow to a considerable size, it is propable that the skin is then capable of expanding like that of larger animals, without being cast. M. Dutrochet, indeed, proved by dissection that the egg-organ (*ovarium*) of the wild chiccory plant-louse (*Aphis Cichorii*) has four tapering chains of what appear to be young becoming larger and larger as they lie nearer to the egg-tube (*oviductus*), and are ready to be excluded. Into this tube he found also a small duct coming from a sort of bladder containing a glutinous liquid; and though he could not determine the use of the liquid, we think it not improbable that it may be (as is certainly the case in other insects) for the purpose of enveloping the eggs laid before winter with a coating to protect them from cold and external injury. Some of these eggs, indeed, such as those of the oak plant-louse and of the American blight (*Aphis lanigera* or *Eriosoma Mali*), appear as if varnished over with brownish glue.

Longevity and Winter Quarters.—M. Bonnet found that the mother plant-lice which he kept in confinement, after producing so many as ninety or more young, became much flatter and smaller, and soon after died, as all insects probably do, when they have laid their due number of eggs.

It is the generally received opinion among naturalists, that plant-lice pass the winter only or chiefly in the egg state, the eggs, or, perhaps more correctly, the cocoons, being hatched the succeeding spring. There can be no doubt, however, that this, if it be the general fact, has exceptions; for many of the perfect plant-lice pass the winter in sheltered places, in a similar manner to the female wasps and humble bees, which pair in the autumn, and while the males all die, they remain ready to bring forth a numerous progeny in spring. That such fertile females are not always to be found in winter, and in the case of the hop-fly, and many others, could not procure their natural food from the plants having withered down, is no more proof of their not doing so, than is the known fact that wasps do not in winter, as in the autumn, fly about our apartments in search of food. For, even on the supposition that they must have some food, though cold diminishes the appetites of all insects, there are other plants besides those most

natural to them, on which they may contrive to subsist. Nothing is more common than to see foreign plants in pots, both in rooms and green-houses, infested with our native plant-lice in the winter time, and even in summer. I have observed the bean dolphin (*A. Fabæ*), spread over a bed of spinage, and among myles or goosefoot (*Chenopodium*) though plenty of fresh bean plants were at hand. Were the distinctive character of the species better known, I have not a doubt that several of them might be observed to feed on more sorts of plants than one or two. The cabbage plant-louse (*Aphis Brassicæ*), for example, thrives well on the common mustard, as well as on the turnip, and, if I mistake not, on the radish; and the root plant-louse of the lettuce, is no less fond of the roots of endive. I think I have also traced the rose plant-louse (*A. Rosæ*) to plants so different as the geraniums (*Pelargonia*), the purple convolvulus (*Lavatera*), and the chrysanthemums. If these views are correct, as I have little doubt they are, there will be no difficulty in accounting for the various species finding food throughout the winter, even when no eggs have been laid in the autumn. Baron de Geer found that the plant-louse which produces the singular looking galls on fir-shoots (*A. Pini*) passes the winter, even in Sweden, where the cold is much more severe than in England, attached to the branches of the fir. (*Mem. des Insects*, III.)

M. Reaumur says, "Towards the end of December and the beginning of January, I have seen several plant-lice on the buds of young shoots on a peach tree, after some days of severe frost. These were wingless females, very plump, and full of young." Similar facts are far from being uncommon, and may be easily verified by any observer who will take the trouble. M. Reaumur states also, that a severe winter is so destructive to them, that it greatly diminishes their numbers the following summer, a remark, however, at variance with what is observed in most other insects, whose numbers are certainly not diminished by the greatest severity of the winter. After the severe winter of 1822-3, for example, plant-lice were very abundant.

Mouth-Suckers, and Mode of Feeding.—The popular notions, often adopted in books by compilers, respecting the mode of feeding in the plant-lice is not only erroneous but impossible in fact. The presence of the hop-fly (*A. Humuli*), says one of these authors, "will entirely depend (else we are much deceived in our observation) on some morbid change in the plant itself, and these are linked together as cause and effect. Now this morbid change will be connected with corresponding mutations in the atmosphere, some blight, imported on the wings of the wind, by which the ambient air is parched, while a crippled and diseased vegetation transpires from its leafage the saccharine exudation called honey-dew;" and as the eagles (*vultures*) "will collect where the carcass is, so aphides congregate where the leaves are imbued with this morbid nectar." But so far from this being the fact, the hop-fly neither does nor can feed on the honey-dew; and if it did, it would prove rather beneficial than otherwise, by clearing it from the leaves, whose respiratory functions it obstructs in the same way as treacle

introduced into the lungs will obstruct the breathing of animals. The unquestionable facts are, that the hop-fly (*Aphis Humuli*), so far from feeding on diseased plants, only selects the youngest and most healthy leaves and shoots, into the tender and most juicy parts of which it thrusts its beak (*haustellum*), which is longer than its body, and no more fitted for lapping honey-dew than the bill of Æsop's crane was for eating out of a shallow plate.

The mere inspection of one of these insects with a pocket magnifier, will be sufficient to demonstrate this position; but, for the sake of illustration, I shall give a few details, and for that purpose I shall select the brown plant-louse of the oak (*A. Quercus*, Linnæus), in which, from its being much larger than its congeners, the parts are more conspicuous. The sucker in this insect is much longer than the body, and, when unemployed, is carried between the legs, close to the belly, extending behind the insect like a tail slightly curved upwards. The instrument consists of a transparent tube, terminating in a hole so minute, that Rèaumur could not discover it with his most powerful microscopes, but easily proved its existence, by pressing out from it a drop of fluid. By means of pressure also, he could render more obvious two instruments of a brownish colour contained in the sucker, and which he conjectured to act like the piston of a pump; though, from their minuteness, this could not be correctly ascertained. We might suppose them to act as perforators, were it not that the point of the sucker itself seems sufficiently adapted to that purpose.

In order to add more power to the suckers, the insects may be observed to elevate the hinder part of their body, while they press down their head to force the sucker deeper into the bark of the plant. It appears to me also, though I cannot vouch for the fact, that after a plant-louse has pierced a hole with its sucker in any plant, it continues there without locomotion night and day, so long as it can find in this hole a sufficient supply of food; never leaving its station, even when bringing forth young, which in a short time take their station near the mother, and pierce holes for themselves. On casting their skins, they are obliged to withdraw their suckers from the holes, as the suckers cast the skin as well as the other parts of the body. On this occasion M. Bonnet observed, that the suckers sometimes stuck in the bark, and were only withdrawn after a considerable struggle.

It will appear from these details not a little singular, that a naturalist so favourably known for his beautiful drawings as Mr. Swainson, should have inadvertently advanced the extraordinary opinion that the "masticating organs" of sucking insects being "totally useless," and such insects "being supported by suction alone, it is obvious that in this state they can do no injury to the agriculturists." It would certainly be good news to the growers of beans, hops, and cabbages, if this strange assertion accorded with fact.

Destructive Effects and Ravages.—With so efficient an instrument as the sucker (*haustellum*) which I have described, I need not wonder that a race so countlessly numerous as the plant-lice, should effect most

destructive ravages on the plants which they infest. The parts they usually attack are the youngest shoots and the youngest leaves, as being most abundant in the juices on which they feed, and at the same time being most easily pierced. It is therefore a very mistaken, though a popular notion, that they only attack plants or leaves already diseased. This notion has originated, like many other errors, from mistaking the effect for the cause; because the insects are seldom observed on account of their minuteness, till they have disordered or deformed the parts attacked, by sucking out the juices designed for healthy nourishment and growth.

We are told by vegetable physiologists, that the sap, after its ascent, is spread out on the upper surface of the leaves, to be exposed to the light and air, where it is converted into pulp, analogous to the blood of animals, and returned by the under surface of the leaf. Now it is usually on the under side of the leaves that the plant-lice establish themselves, to catch up this pulp as soon as it is prepared, or on the young shoots, where they take it up as it descends. The whole plant is thus robbed of its nourishment, and the leaves shrivel up, as is seen on the cabbage, and on the plum and the currant tree; or the blossoms drop, and the fruit does not set, as is seen in the bean and the hop.

Excrementitious and other Discharges.—It is now ascertained that plants which feed solely on liquid food discharge into the air, and also into the soil where they grow, excrementitious gases and liquids, being the portions of food which they could not appropriate as nourishment. The plant-lice, which also live, as we have seen, wholly on liquid food, discharge no solid excrements. As the plant-lice differ in so many particulars from other animals, so do they in these discharges, which both take place in the usual way by the vent (*anus*), and also by what may be appropriately termed the rump-tubes (*tubuli uropygii*), one on each side of the rump, long and horn-like in some species, in others with no projection but a mere opening.

Through these is discharged a clear, colourless fluid, clammy and sweet like honey, and on evaporation leaving upon paper a gummy mark, not unlike that left by solution of gum-arabic. This is what is popularly termed *honey-dew*, respecting which so many unfounded and very absurd opinions have been and still are promulgated. Pliny hesitates whether to term it the sweat of the heavens, the saliva of the stars, or a liquid produced by the purgation of the air.

"I have seen," says Dr. Mason Good, "as probably many who read this work have also, a hop-ground completely overrun and desolated by the hop-green-louse (*Aphis Humuli*) within twelve hours after a honey-dew (which is a peculiar haze or mist loaded with poisonous miasm) has slowly swept through the plantation, and stimulated the leaves of the hop to the morbid secretion of a saccharine and viscid juice, which, while it destroys the young shoots by exhaustion, renders them a favourite resort for this insect, and a cherishing nidus for myriads of little dots that are its eggs."—*Study of Medicine*, 3d edit. i. 339.) The whole of this is obviously erroneous and fanciful, for it has

been already proved that the mouth of a plant-louse is quite unfitted to feed on honey-dew, and that the shoots are not morbid nor unhealthy till attacked by the insects; while the "little dots" described as "eggs" are nothing but the cast skins, the insects never laying eggs at the season in question.

Linnæus, on the contrary, who did not adopt this popular fancy of a miasmatous haze, ascribes the honey-dew, on the leaves of the hop at least, to a diseased state of the plant, caused by the caterpillars of the ghost-moth (*Hepialus Humuli*) attacking the roots,—a very far-fetched and unfounded explanation. Dr. Withering, however, believing it correct, recommends covering the roots of the hop with stones as a preventive, inasmuch as the caterpillars, he avers, never attack wild hops, which grow in stony places. Mr. Swainson terms honey-dew one of the diseases of vegetables!

Another ill-informed writer says, the "honey-dew *mostly occurs after* the crops have been attacked by the plant-lice." Sir J. E. Smith, though he admits the correct explanation given above as the *common* cause of honey-dew, contends that what is found on the leaves of the beech is an exception, but he adduces no evidence at all satisfactory in proof of its being caused by unfavourable winds; while the undoubted fact of its being the excrement of plant-lice in so many other instances weighs directly against him.

A novel theory of honey-dew has recently been published, which ascribes it to an electric change in the air. "Last summer," says the author, "we investigated the phenomenon with great care: the weather had been parched and sultry for some weeks previous, and the honey-dew prevailed to such an extent, that the leaves of the currant, raspberry, &c. in the gardens, literally distilled from their tips a clear, limpid honey-dew, excreted from the plant; for the phenomenon was observable on those plants that were entirely free from aphides, and so copious was it, where these insects were found, that had their numbers been centuple, they could not certainly have been the source of the supply. The question with me, however, was set at rest by applying a lens, having previously washed and dried the leaf with a sponge, for in this case the immediately excreted globules became apparent." But in this, of wiping a leaf, might not the leaf have been previously wounded, perhaps, by the beak of some plant-louse, and hence the exudation of sap, not honey-dew? and may not the circumstances of finding the honey-dew on leaves where there are no plant-lice be accounted for on the principle that the insects had abandoned, as they always do, the parts covered with their *ejecta*, unless these fell from insects on some overhanging branch? It is, indeed, justly remarked by M. Sauvages, that they are careful to eject the honey-dew to a distance from where they may be feeding. I have now (March) in my study a plant of the Chinese chrysanthemum (*Anthemis artemisiæfolia*, Willdenow), the young shoots of which have swarmed with plant-lice all the winter, and the leaves below are covered with honey-dew. I tried the experiment of wiping it off from a leaf, but no more was

formed when it was protected by a piece of writing-paper from the plant-lice above; while the writing-paper became sprinkled all over with it in a few hours. By means of a lens, also, I have actually seen the plant-lice ejecting the honey.

The honey-dew ejected by the plant-lice is most obvious in the case of the mealy species (*Eriosoma*), and in those of the elm, the poplar, and the apple (American blight), as also sometimes in the cabbage plant-louse, it may be seen in round drops of a yellow colour, from the size of a pin's head to that of a currant, or even of a grape. When of small size, these drops have by some been mistaken for eggs. Ants, as well as wasps (though not bees), are extremely fond of the honey-dew, and hence ants have been accused sometimes of the injuries done by the plant-lice, a fancy as unfounded as M. Huber's, who represents the ants as keeping flocks of plant-lice in winter, as we keep milch-cows, and as having a language to command them to eject it when required;—all a misrepresentation of common facts, ingenious, without doubt, as all M. Huber's observations are, but in this case quite fanciful.

Honey-dew is sometimes ejected in considerable quantity, and more than once I have mistaken it under trees for drops of rain; and Major witnessed an instance in which a causeway under some sycamores infested with plant-lice was sprinkled with honey-dew similar to a shower of rain.

Spreading and Migrations.—It seems to be the general rule of nature to diffuse the several species of animals over as great a space as possible, and thus to stock every corner of the earth with life and enjoyment. In the well-known migrations of the swallows and other birds, the chief incitement evidently arises from the scarcity or abundance of food; and in like manner, were the destructive swarms of locusts to remain stationary, they must necessarily starve. But though plant-lice are, next to locusts, perhaps the most extensively destructive insect, it is seldom that even their greatest ravages exhaust their appropriate food. As they chiefly, however, feed upon the young shoots and the young leaves, the advance of the season renders these too hard to be penetrated, or too juiceless to be worth penetrating, by the plant-lice, which are accordingly thus compelled either to shift their quarters to some other species of plant later in producing young shoots, or to deposite their eggs to be hatched when their peculiar food comes again into season.

I have already quoted the account which White of Selborne gives of what he terms a shower of plant-lice. Another naturalist says, "A similar emigration of these flies I once witnessed, to my great annoyance, when travelling late in the year in the Isle of Ely. The air was so full of them, that they were incessantly flying into my eyes, nostrils, &c., and my clothes were covered by them; and in 1814, in the autumn, the aphides were so abundant for a few days in the vicinity of Ipswich, as to be noted with surprise by the most incurious observer."

I confess I feel not a little disappointed that the species is not mentioned in these instances, as it might serve to fill up a blank in the history of some of those which are most destructive. In the case of the hop fly, I have myself remarked, for several successive years, that soon after midsummer they all disappear, though the leaves have only a few days before been literally covered with them in millions. The same is the case with those called the dolphin, which infest the bean (*Aphis Fabæ*), and that which infests the elder, named the zebra (*A. Sambuci*). It is highly probable that all these perish soon after the deposition of the eggs for the succeeding spring; but it is by no means an easy thing to ascertain this. If they migrate to the sea-coast and are drowned, as we are partly entitled, from the statements just given, to infer, their fate is similar to that of the locust.

To enable the plant-lice to migrate, I have to point out one of the most singular adaptations of Providence known in any animal. When these insects first appear in spring, they are all females, and without wings; but as the season advances, and it becomes indispensible for some of them to shift their quarters to procure food, a number are produced with wings, these also being all females. But upon one of these winged females settling in new quarters at a distance from her place of birth, she does not bring forth winged young ones like herself, but chiefly wingless ones, among which, however, a few winged ones also appear, all being still females. In the autumn, when males are produced, the greater number are without wings, but, like the winged females, already mentioned, some males are also produced with wings, to enable them to migrate. M. Bonnet proved that the winged ones, both male and female, pair with the wingless ones. Those young ones which are destined to become winged, do not shew their wings till the third or fourth moult, the wings remaining folded up in little bunches at the shoulders. "I saw one of them," says Leuwenhoeck, "put off its skin and assume a new form; its wings, which before had been folded up very close, it expanded by degrees, shaking them slightly, and then they appeared as straight and regularly placed as if they had never been folded up; and the same I observed in others." (*Arcana Naturæ.*)

Natural Enemies of Plant Lice.—Systematic writers and compilers have altogether overlooked the fact, that the immense swarms of plant-lice produced on almost every species of vegetable, appear to have been intended by Providence to supply food to the smaller soft-billed birds (*Sylviadæ*), particularly the yellow wrens, the gold-crest, the babillard, and many others. It is no uncommon thing for gardeners, who observe these little birds busy among their growing-crop in search of plant-lice, to accuse them of devouring the crop itself,—a circumstance quite impossible, in consequence of the structure of their bills. Even so excellent a naturalist as White of Selborne was mistaken in this. "The willow wrens (the smaller sort)," he says, "are horrid pests in a garden, destroying the peas, cherries, currants," &c. "This sentence," says the Hon. and Rev. W. Herbert, "has probably been

the cause of the murder of numbers of these most innocent little birds, which are, in truth, peculiarly the gardener's friends. My garden men were in the habit of catching the hens on their nests in the strawberry beds, and killing them, under the impression that they made great ravage among the cherries; yet I can assert that they never taste the fruit, nor can those which are reared from the nest in confinement be induced to touch it. They peck the aphides, which are injurious to the fruit-trees, and, being very pugnacious little birds, I have sometimes seen them take post in a cherry-tree, and drive away every bird that attempted to enter it, though of greater size and strength. The birds which are mistaken for them are the young of the garden-warbler (*Sylvia hortensis*), with which Mr White was not acquainted.

"I could not persuade my gardener that the yellow wrens did not eat the cherries, till he had shot some garden-warblers in the act of eating them, and compared them with the wrens, when he became satisfied with the error, In order to ascertain, beyond doubt, whether the yellow wrens ever eat fruit, I left some which had been reared tame from the nest, and, of course, were more likely to feed upon any new thing than the wild birds, without victuals, till they were very hungry, and I then offered them little bits of ripe cherry. They seized them with avidity, but immediately threw them down again; and it was evident that they would rather have starved than ate the fruit. I had no doubt of the fact, but I wished to set the question completely at rest, for I have seen them pulling the leaves of the cherry-tree so near the fruit, that any person might be deceived, and think they were eating it; and the young of the garden-warblers look so like them, that I am not the least surprised at their having got into bad repute with the gardeners." (*White's Selborne*, p. 63, *note*, 8vo. edit. 1832.) It is very obvious, I may add, that these slender-billed birds could never do any damage to pease, even if they had, as they assuredly have not, a fancy to eat them; but they are fond of frequenting pea-crops, to devour the plant-lice which infest them.

Next to birds, the most destructive natural enemies of plant-lice are insects, some of which, as in the case of the birds, are accused of committing the depredations they actually prevent; and there we should earnestly impress it upon gardners and farmers to be careful, before they set about destroying any prevalent insect, to ascertain that the one they attack is the real depredator, as it may as frequently happen to be one of those which feeds upon the destroyers. The simple test is seeing an insect actually eat or suck, and then there can be no doubt. Some time ago, I remarked, in a periodical work, an account by a correspondent of the ravages committed on beans, turnips, and hops, by the "shrimp" grub of the common lady-bird (*Coccinella septem-punctata*), though these insects, in both their active stages of life, most certainly never touch vegetable substances, feeding entirely on the green flies or plant-lice (*Aphides*), which are the cause of the destruction of which the lady-birds have been thus unjustly accused. This gentlemen, however, seems to have thought himself entitled to accuse the

lady-birds, merely because he saw them resting on (*not sucking or eating*) the turnips and hops, on the same sort of evidence as we might accuse him of eating grass, like Nebuchadnezzar, if we found him in a meadow. An orchardist at Pontefract destroyed many lady-birds as injurious in 1823!

The grubs of most species of lady-birds are about the size of a house-fly without its wings, rather flat, broadest about the shoulders, and tapering off towards the tail; the general colour bluish, or brownish-black, with usually a few dull orange spots. They have six feet, and move rather slowly. In some seasons they multiply very much, as in 1807, when they covered the cliffs at Brighton, and of all the watering-places on the Kentish and Sussex coasts, in such numbers as alarmed the ignorant and superstitious. In 1826, the lady-birds cleared off swarms of the gooseberry plant-louse. Several instances of a similar kind are on record. The lady-birds themselves, as well as their grubs, feed on the plant-lice. The grubs, also of lace-winged flies (*Hemerobidæ*), well known for their slow flight, their broad, pale, greenish, gauze-like wings, their shining, amber-like eyes, and bad scent are so great devourers of the plant-lice, that M. Reaumur calls them plant-lice lions. These grubs are longer bodied, and not so common as the lady-bird grubs.

The maggots of some of the larger species of garden-flies, called from their colour, wasp-flies (*Syrphidæ*), and sometimes ignorantly mistaken for bees, are more common than the last. These maggots have no feet, are soft and slimy, are thickest at the tail, tapering towards the head, and are greenish or brownish white. So late as December (1834), owing to the mild weather, I found one of those maggots feeding on the cabbage plant-lice at Lee, in Kent. All these aphidivourous insects are slow in their movements, for, as the plant-lice never move from their feeding-places so long as they can obtain food, their enemies require neither agility nor stratagem in order to catch their prey, and the plant-lice themselves make no effort to escape. "So great is their stupidity," says Dr. Virey of Paris, "that they see their comrades devoured by their side, without dreaming that a similar fate awaits themselves. If this is philosophy and contempt of life, it certainly could not not be carried farther; for the old stoics themselves never manifested half the indifference and apathy of our plant-lice." (*De Mœeurs et des Instincts*, ii. 393.) Besides these insects which seem thus to be in some degree peculiarly aphidivorous, the plant-lice do not escape from the common pest of the insect world, the ichneumon flies, whose well-known custom is to deposite their eggs in the bodies of other insects, and the grubs, when hatched, therefore feed upon the living vitals of the creature infested, till death is the inevitable consequence. The species of ichneumons which thus attack plant-lice are necessarily small, and were first, I believe, described by Mr. William Curtis, in the *Linnean Transactions*, and one species is figured by Harris is his *Exposition of English Insects*. The phenomena attending them are singular.

There may often be remarked, on the leaves of various plants frequented by plant-lice, small, smooth, roundish bodies, not unlike a seed of the pimpernel (*Anagallis arvensis*), somewhat flattened on the under side, by which they seem glued down. I had long remarked such bodies, and had always supposed them to be a species of scale insect (*Coccus*); but having, last autumn, found a considerable number of such bodies in the very centre of many living families of the cabbage plant-louse (*Aphis Brassicæ*), I came to the conclusion, that the bodies most probably belonged to this species. On squeezing one of the bodies, it was found that the outer covering or shell was rather hard, and the interior filled with a thick orange-yellow fluid, like that in the chrysalis of a butterfly, or the pupa of a moth, leaving no doubt that it was organized and endowed with life; that, in fact, it was a sort of pupa analogous to those of the wasp-flies (*Syrphidæ*) in the skin, having changed texture without any moulting, as takes place in butterflies,—confirmed also by the remains of the legs of the insect being still attached.

I inclosed about a dozen of these in a chemical test tube, and in a few days I was surprised to find that a number of ichneumon flies had issued from them. I afterwards met with Mr Curtis's paper, in which he shews that the grub of the ichneumon changes into a pupa in the body of the plant-louse, the skin of the latter hardening over it after the creature dies.

The number of plant-lice thus destroyed by ichneumons, is probably not very considerable; but as it seems to occur more particularly late in autumn, and about the beginning of winter, when the plant-lice are less numerous, it must tend to diminish the plant-lice, which otherwise would breed in spring, and may be intended by Providence as a check on their numbers.

Ear-wigs all devour plant-lice, particularly the species which cause leaves to shrivel and roll up.

Artificial Methods of destroying Plant-Lice.—Were it nothing more than supplying food for so many birds and insects, it would be a libel on Providence to say that plant-lice have been made in vain. They may also be conjectured to have been provided as a check upon the too great increase of particular plants; but this, though no doubt important in a natural state of things, by no means accords with the artificial views of gardeners and farmers, who desire such increase to be as great as possible.

In order to keep down the numbers of plant-lice, the first thing we should recommend is, to give all possible encouragement to the breeding of their natural enemies, the soft-billed birds, and the insects already mentioned; for we are sorry to say, that all other methods recommended are sadly deficient in being extensively effectual. Were it possible, as it seems not to be, to discover the winter deposites of the eggs or pupæ, or the winter retreats of the insects themselves, when these continue to live, something effectual might be done. But when it is recollected that snails and slugs, which are so much larger and

more easily seen, continue to infest gardens, notwithstanding the precautions taken to extirpate them, we cannot hope much to be done against the small or minute plant-lice.

One of the methods for destroying plant-lice is by means of tobacco smoke, thrown forcibly on the infected plants by means of a pair of bellows, a plan which answers well in the case of small plants, when they are previously covered, as recommended by Dr. Darwin, with inverted funnels of brown paper, to confine the smoke. In the stove and the conservatory, again, the whole place may be shut close up, and half a pound, or some such quantity of tobacco, may be burnt on a brazier, without injury to the plants.

In the case of plants which cannot be conveniently smoked, tobacco, in finer powder than snuff, should be strewed on the leaves when they are moistened with dew or rain; or tobacco water may be squirted over them, by means of a syringe or a garden engine. This is made by pouring a pailful or so of boiling water over half a pound or more of tobacco in a close vessel. M. Bouché recommends sprinkling the leaves with powdered quicklime, as next in efficacy to tobacco; but I have found it ineffectual. It may not be amiss here to mention some of the methods which have been proposed, and which have either been unsuccessful in destroying the plant-lice, or have proved injurious to the plants. Potato water, from its known poisonous quality, was supposed to be destructive to plant-lice, but experience has not proved this. Smearing the joints of plants where eggs may be supposed to have been laid, is equally futile, for, as M. Bouché remarks, it is soon washed off by rain, or cracks, and falls off through dryness.

Early in the spring, Dr. Darwin directed a nectarine tree to be moistened with tar-water, and parts of the wall to be smeared with tar; another to be moistened with lime and potash dissolved in water; a third with soap-suds, and lime added to them; and many, both nectarine and peach trees, with soap-suds alone. This was done by means of a brush, before any flowers appeared, and was repeated thrice on different days; but, to his great disappointment, when the leaves appeared, they became affected with the plant-lice as on former years. He also afterwards dipped many nut-leaves crowded with the plant-lice in a strong infusion of tobacco, for a few minutes, as the leaves hung on the trees, without, as he believed, destroying the insects, though some of them appeared for a time to be rendered torpid.

Dr. Darwin also sprinkled some oil of turpentine, by means of a brush, on some branches of a nectarine tree, which was covered with the plant louse; but it killed both the insect and the branches. A solution of arsenic, much diluted, did the same; but might not the scent of turpentine, or of tar, smeared on a fruit-wall, deter the flies from approaching the trees to deposite their eggs? or might not arsenic, mixed with honey, smeared on the wall to which the trees are nailed, be likely to attract the plant-lice as well as other kinds of flying insects? But none of these should be smeared on the branches, lest it injure or destroy the tree. M. de Thosse having observed that his trees were

attacked by multitudes of small insects of different colours, which injured their young branches, he destroyed them all in the following manner:—He put into a bowl a few handfuls of earth, on which he poured a small quantity of oil of turpentine; he then beat the whole together with a small spatula, pouring on it water till it became of the consistence of soup; with this mixture he moistened the ends of the branches, and both the insects and their eggs were destroyed, and other insects kept aloof by the scent of the turpentine.

A more recent writer, Mr. L. Knapp, has the following observations applicable to the species which infest the branches and bark of trees, such as the American blight:—"Many remedies," he says, "have been proposed for removing this evil, efficacious, perhaps, in some cases upon a small scale; but when the injury has existed some time, and extended its influence over the parts of a large tree, I apprehend it will take its course, and the tree die. Upon young plants, and in places where a brush can be applied, any substance that can be used in a liquid state, to harden into a coat, insoluble by rain, will assuredly confine the ravages of the creatures, and smother them. Hard rubbing with a dry brush crushes many, but there are crevices into which bristles cannot enter: thus some escape, and propagation continues. I have very successfully removed the American blight from young trees, and from recently attacked places in those more advanced, by an easy application. Melt about three ounces of rosin in an open pipkin; take it from the fire, and pour into it about three ounces of fresh oil; the ingredients perfectly unite, and when cold acquire the consistence of honey. A slight degree of heat will liquefy it, and in this state paint over every node or imperfect part in a tree, using a common painter's brush. The substance soon hardens, and forms a varnish, which prevents any escape, and stifles the individuals. After this first dressing, a second application to these parts will, I think, be found to effect a perfect cure."

Mr. George Lindley, in his excellent *Guide*, advises, when trees are infested with the American blight, to divest them completely of their loose bark, and to pare off smooth with a sharp knife, or scrape clear all places where the insects have formed excrescences round the knots; and then to apply with a strong painter's brush till the bark become completely covered, the following wash:—Take one gallon of quick-lime, half a pound of flowers of sulphur, and a quarter of a pound of lamp-black; mix the whole together with as much boiling water as will form the ingredients into a thick paint. It should be applied about blood-warm. As an efficacious application, at a moderate cost, Mr. Couch recommends dilute sulphuric acid, three quarters of an ounce of which being mixed with seven ounces and a half of water. It is best applied in showery weather, by means of rags, but should not be put upon the young shoots, as it would prove injurious. It is no less destructive to moss and lichens than to plant-lice. Major's preparation, however, appears to be the best. He dissolves one pound of soap in two gallons of water, and adds more water to make five or six gallons.

This is warmed and brushed over the shoots in spring with a painter's brush, repeating the process as often as is required. Major adds, that sulphur is of no use, while turpentine and oil injure the buds, the leaves, and the young shoots, though they do not affect the old bark. Soap-suds will not by itself kill the insects, unless they are very strong; but, along with tobacco-water, they appear to be the best thing hitherto discovered.

Tobacco-water, which is so useful in destroying plant-lice, may be had at the cost of about sixpence or eightpence a gallon, at the tobacco-manufactories; and one pound of soap, in four gallons of water, mixed with three or four gallons of this tobacco-water, or thrice the quantity of tobacco-water made from English tobacco, and thrown blood-warm from a garden-engine, in the form of fine rain, is a good mode of application to all the plant-lice which frequent leaves and young shoots.—*Quarterly Journal of Agriculture.*

ON THE MOST ELIGIBLE MODE OF APPROPRIATING VEGETABLE PRODUCE FOR THE SUPPLY OF CATTLE, SHEEP, AND HORSES.

BY GEORGE WEBB HALL, ESQ.

To the Secretary to the Society for the Encouragement of Arts, Manufacturers, and Commerce.

Sir,—Prompted by the desire of communicating to the public the result of some experiments and observations on the feeding of cattle, and not uninfluenced by the liberality of the society of which you are the official organ, and the general invitation by which it annually encourages the production of practical remarks for the general good, I proceed to lay before you a plan for the feeding of every description of cattle, which I consider, if further confirmed by more extended experience, may prove instrumental in economising and increasing the resources of this country to an astonishing degree.

That the plan I am about to submit for scrutiny and consideration is entirely novel and original, I do not for a moment pretend; but that some arrangements connected therewith, which will be detailed, have not before been adopted, introduced, or made known, may perhaps be equally clear; and upon these additions to a system, which has been canvassed thoroughly, and tried practically and extensively in the last twenty years, the economy and benefit of the system I am now about to recommend may chiefly depend.

Well aware that much exaggeration frequently exists, or may be suspected, in a description of any new mode of procedure which promises great advantages to those who adopt it, and that the sanguine, if sincere, representations of its supporters, have frequently been lowered or entirely sunk under the test of reality, it is with some degree of hesitation that the extensive advantages which I certainly anticipate

from the system now to be proposed will be detailed; but it is time that it should should come itself under review.

The common system of depasturing domestic animals in our fields has long been known to occupy and require an immense proportion of the land in this country to produce that supply of animal food which our markets demands. It is known to every one conversant with rural affairs, that in particular situations, with certain crops and seasons of the year, the waste of food occasioned by the animals themselves, when depasturing on the land, is both great and lamentable; and long since was the attention of intelligent men directed to the means of remedying the evil. The system of soiling, or stall-feeding cattle, was introduced for this end; it was strongly recommended by some, closely canvassed by others, and was open to the investigation of all. Still, however, the extent to which it has prevailed, except for the winter months, is surprisingly limited; and, however flattering have been the accounts of the benefits derived by some of its advocates, it is clear it has not laid hold on the public attention, to lead to its general use.

Some circumstances may perhaps be pointed out to account for the failure of the high-raised hopes which were indulged respecting it, and will shew, that unremitting attention was necessary to its success, and labour was encountered at every step; prejudices, too, were enlisted against it, and some solid objections were clearly adduced.

The feeding of cattle in stalls is much more easy to accomplish successfully in winter than in summer. In the former period they gladly and quietly accept the shelter afforded them, while, on the approach of spring, they as anxiously desire the freshness of the open fields, as migrating birds their change of climate.

There is no exaggeration in what is here described. Cattle will continue in a state of contentment, if not neglected in their food, tied to the same post for four or five of the winter months, they will generally eat their food with readiness, or eagerness, nor do they appear to require exercise, or change of place. In the summer it is far different, both as regards their food and situation. The food being at that time in a succulent state, highly prone to fermentation, becomes very soon heated and distasteful for the cattle, either in the removal from the fields to the stalls, or lying there till it is consumed; the heat of the stalls themselves, in the warmer season of summer, unless particularly well constructed, soon taints the food with which the cattle are supplied, and their constant breathings over it requires that their provender should be supplied frequently, and only in small quantities. This entails constant attendance and much attention to supply their wants, in the absence of which, discontent and a stationary or retrograding condition, soon appear; and no less care is requisite to ensure the sweetness and cleanliness of the stalls, either by a frequent supply of straw, or any other means.

Under management thus careful, and with artificial grasses, it is practicable to consume the produce of adjacent fields with benefit to the cattle, and a very material saving to the crop; and where straw is

abundant, or of little value, an immense supply of excellent manure will be obtained. With regard to carrying off the produce of natural pasture to be thus consumed, the advantage is much less evident; the produce to the scythe will not correspond in quantity with artificial grasses at a period of the year equally early; the former depending for its abundance more on thickness than on height, is less fitted for repeated mowing, and the injury sustained by natural pasture from repeated cutting, with the produce removed, is scarcely counterbalanced by very liberal applications of manure.

Soiling of sheep, in the summer time at least, is very rare; and all the points of attention enumerated for cattle, exist here with still greater force.

So congenial is this mode of management to animals which have become habituated to it, that such as on being first confined exhibit every token of discontent, by attention and regularity become reconciled to the limits within which they are enclosed, and receiving the food allotted to them, sink to that state of quiescence and contentment to which, at first, they were entire strangers.

I have considered it desirable to enter thus lightly on the subject of soiling, or stall-feeding, as occasionally practised, before laying down the plan about to be recommended for the appropriation of grasses and other green vegetable food, the better to mark the line of distinction to be drawn between the two; and were not the practice of fencing off turnips and some other crops, by succeeding daily portions, universally known, I should make a slight allusion to that practice for a similar reason.

It is a union of these modes of feeding domestic animals, "folding" and "stall-feeding," with some additions and modifications, that I am about to record as a system of husbandry which promises advantages numerous and important; which tends to economize and preserve produce that before was lost, and at the same time to set industry in motion in an increased degree. Applicable peculiarly to grasses and to sheep, the increase and economy of manure is such as to enable land to be brought to any degree of luxuriance by a continuance of the process.

Soiling on the land on which the crop has been produced, by enclosing the sheep or cattle in a sufficient fold, cutting the grass in advance and supplying it to them in racks, is the substance of the proposition, the practicability and success of which shall now be proceeded with in detail. This has been performed, however, *with covered moveable sheds standing in the fold, capable of affording shelter from the inclemency of weather to the whole number of sheep thus supplied*; and it is in connexion only with shade and shelter that the mode of management under discussion is thus strongly approved. It must be admitted, too, that some difficulty and discontent were experienced at the commencement of the undertaking, and some indications of want of thriving, were for a short time manifested. A very few days, however, and the addition of a little salt, sprinkled upon the grass when placed in the racks, fully

reconciled the sheep to their confinement, and brought them, ere long, to an improved condition, with perfect contentment and never failing appetite for their food.

To allow a flock of sheep to disperse over a field of turnips, and feed where they please, is so evidently wasteful, that under the worst management alone it is ever suffered to exist. To confine them within fences, in order to consume the produce of grass land, as practised with turnips, is a method full as rare as the one this moment condemned, but deserving of a very different expression of opinion. All the advantages of folding off turnips on the land, a practice which has added millions to the value of our annual agricultural produce, exists here, as far as the fields are concerned; and if it can be shown that the cattle can beneficially be supplied with food under such an arrangement, it will scarcely be contended that an essential benefit will not be conferred upon the cultivation of the soil.

It may be well, at this time, to bring under review the circumstances connected with the different modes of appropriating grass as food for cattle, and the principles will then be more evident which point out the benefits of the system under discussion. The usual mode of depasturing is the practice of nature and uncultivated countries; to economise and multiply the produce of both, is a refinement and improvement of science—stimulated by the greater value of the crops on land, which has long been under the care of man.

To obtain the benefits of the latter course, some capital must generally be expended, and labour employed, and reflection is commonly required to discern through the immediate expense, the more remote advantages. They are, however, in most cases of this kind, great and important; *and the requirement of capital in a country where capital abounds—of labour where labour is too little in demand—are distinguished advantages rather than objections to any plan which fairly offers a result, a most liberal increase of productions constantly more and more required by the population at large.*

To obtain, therefore, an increased supply of the necessaries of life, by an expenditure of capital and an employment of labour, presents such a combination of advantages to the country at large as demands the most patient investigation of any fair prospect of accomplishing these desirable ends; and I therefore proceed with less scruple to canvass minutely the arguments which support or oppose existing arrangements. In allowing cattle of of any description to range over extensive fields and crop their own food, a wide choice is afforded to them of seeking the best and most palatable grasses which the enclosures present; they depend upon their own appetite and exertion alone for a sufficient supply, and they are not exposed to the chances of neglect, which cattle in a state of greater confinement must ever encounter. The benefit of cleanliness and good air is always adding to their comfort—and shade, and some portion of shelter, they are seldom in such situations wholly debarred from; it is not surprising, therefore, that under such circumstances, where room is afforded to them, they

luxuriate and thrive in a surprising degree—and viewed with that complacency which an admirer of fine cattle so generally feels at the comfort, good appearance, and contentment of his stock, he should be disposed to estimate above its real importance a practice which lays under contribution so large a portion of the best land of this country, for the supply of animal life; and that he should regard with suspicion and with prejudice any attempt to encroach upon the privileges of his animals which he attends with such peculiar care.

Since the period from which the improvement of domestic animals may be fairly dated—the time of Bakewell—the importance of obtaining superior stock has been so deeply rooted, that no expence, no sacrifice, has been scarcely considered too great, to obtain pre-eminence of breed. That these expenses should be incurred, and produce lavished, by some individuals, is perhaps as desirable as that they should be abstained from by the great majority of owners of cattle; for by the peculiar attention of those who devote themselves to the improvement of the breeds of animals, a supply of seed is raised, which can communicate its valuable properties to extensive flocks and herds, habituated to less wasteful and expensive modes of feeding than may be allowed for a few.

When, therefore, preposession in favour of the depasturing of cattle, as regards their thriving, is considered; the importance attached to this branch of agriculture—regardless of the charge at which it is procured; when the opposite modes of stall-feeding and of folding require labour and expense at the very commencement of the undertaking, and unremitting attention and good management in continuance; and when labour and attention are not unfrequently considered trouble and annoyance, it is in no degree surprising, that until the advantages are clearly pointed out and exemplified, few should incur the outlay and risk which are considered to attach, in order to obtain the undoubted saving of vegetable food which such systems afford.

The advantages of depasturing at large having been detailed, it may now be well to rehearse the inconveniences attending it, and the benefit of an opposite course. The waste from the treading and manure of cattle first presents itself, which is still greater in proportion as the land is manured and well managed, and yielding a bounteous crop; the destruction of valuable herbage from this cause is acknowledged to be very great, and, in seasons of much rain, equal to, or exceeding the consumption of the animals depastured. It is proverbially said, in such cases, that they have each five mouths, the feet being equally efficient in consuming food as the only beneficial channel to which it can be consigned. The freshness of their daily food is also destroyed by the full access, at once, to several weeks supply; and especially with sheep, the ground becomes tainted with their odour, which is by no means agreeable to the animals themselves. Where the range of a field is allowed, and the first freshness of it consumed, animals spend a considerable portion of their time, which might be more beneficially employed in rest, in walking over the land to select from the remain-

ing herbage whatever is most agreeable to their tastes; and the desire of being indulged growing with indulgence, they soon manifest anxiety for removal, and discontent with their enclosures, when the best portions of the produce alone are consumed. The inequality, therefore, of the feeding of cattle at large in the fields, is one of the inconveniences attendant upon that measure, and is occasionally met by letting the different classes of stock succeed each other in rotation, where the number of enclosures will permit, and thus afford more frequent changes. The grazier, the dairyman, and the flockmaster, will all bear testimony to the beneficial influence of frequent change to the thriving and well-being of the animals under their respective care. This cannot take place where the enclosures are large, and small enclosures are still more prodigal in waste from treading than large ones; to combine, therefore, frequent change with some regard to the economy of food under the common system of depasturing, can only be obtained by enclosures of a moderate size, with a due admixture of the different kinds of animals to feed upon them,—circumstances which do not always present themselves together.

The difference in value of the manure from animals depastured at large on the land, compared with the effect of folding, is far too important to be here overlooked. The casual excretions of animals unconfined, on different parts of the pasture, is, for the time, a nuisance instead of an advantage, as it prevents the consumption of a considerable portion of the food alloted for them, and renders the surrounding grass distasteful to the stock; to a great extent, likewise, the manure is itself lost, or very partially useful; it is not sufficiently concentrated for much utility, and by extension and subdivision its effects are but feebly manifested, and we know not where to find the increase it is capable of producing.

The quiescence of the cattle, and their freedom from exertion in obtaining a supply of food, depend entirely upon the abundance of grass in the pastures. When they become bare, or present only coarse tufts of grass, the greater part of the day must be spent in nibbling still closer the parts already cropped, and no portion of the land to which they then have access has power to extend its growth, as under a different arrangement it is capable of doing. Instead of different portions of the allotted land succeeding each other in due succession, and with various degrees of growth, little progress can be comparatively made on land which is daily traversed by any considerable portion of live stock, and the freshness which their absence alone can restore, does not take place.

Such are some of the leading disadvantages of depasturing animals in the open fields; the inconveniences of stall-feeding, in fixed houses, have been already alluded to, and the great desideratum therefore is, to obtain all the benefits of both systems without the attendant deficiencies on either.

Plenty of nutritious food is indispensably required.

Access to both shade and shelter, at all times, is certainly highly beneficial.

A free circulation of air is highly salutary to every animal. Complete cleanliness and freshness, both in food and bed, promote the health and progress of all.

Equality and regularity of feeding have manifested their good effects to every discerning owner of cattle.

The manure from the animals being concentrated, preserved, and kept perfectly distinct from their food, is so obviously beneficial as to require no comment.

It will be attempted to combine all that is here laid down. Let a spacious fold, about double the usual size, be made at the entrance of a field devoted to the reception of a flock of sheep, by enclosing it with hurdles, or other fence, in the usual way, and before the sheep are turned in, let the intermediate space be mown, and the grass placed in racks extending parallel with the hurdles, on the side nearest the uncut grass. It may be well to make the fold of an oblong shape, to proceed side forwards; the labour of putting the grass in the racks will then be very trivial. When cut by the shepherd, a boy can speedily perform it, as the distance to carry it under this arrangement will be only a few yards, it being dropped over the hurdles into the racks, which are constructed open at the top on purpose thus easily to receive it. The sheep should be fed, of course, as they require it, and the grass be cut in advance, or given fresh, as the animals at the time may prefer it. The fold in which they are enclosed will be also nibbled closely down, and trodden in every part, and when they move forward to a succeeding portion, it will be generally as level as a garden lawn. Should any disinclination at first be manifested to the grass in the racks, a sprinkling of salt will render it more to the animals' taste, and when habituated to it, which will soon be the case, it may be expedient to allow the sheep to first pick over their food, and put a little salt with the remainder, which will then be readily eaten. In the fold where this course was pursued, moveable sheds, constructed of deal board roofs upon ash frames, with low cast-iron wheels, were standing, capable of affording shade or shelter to the whole number of animals enclosed. It being quite optional whether they resorted to them or not, a fair opportunity was afforded of ascertaining the natural disposition of the animals themselves. It was gratifying, too, to ascertain that the provision which had been made for their defence was not useless or rejected, for generally, when any rain fell, the whole of the flock resorted to the sheds spontaneously, and preserved their fleeces dry, on which the good quality of wool so much depends. In a fold of wide dimensions, a second or even a third day, may elapse before the hurdles need be changed,—dependent, however, on the quantity of herbage the field may produce. A description of one day is still an exemplification of the whole plan, and although a catalogue of the advantages attendant upon it may occupy some pages, a very few lines have been enough to describe an arrangement which, as far as I have hitherto had opportunity of judging, I consider may be productive of a national saving of millions.

To proceed with the advantages which a system so simple is capable

of yielding, I may remark, that an enclosure thus managed will sustain certainly double the amount of stock which it would otherwise do, and still keep considerably within due bounds; the field will be left in a condition beyond compare superior to the usual mode of feeding; every particle of manure is properly appropriated and deposited on the land; the animals, one and all, with an abundance of racks properly supplied, can fill their bellies whenever they require food; all are fed alike; no wandering about, wasting their flesh to seek for some grasses, and to reject others; the fleece defended from wet, from briars, and the like; their feet preserved from long wet grass, which occasions foot rot; their skins from the shade of trees, where flies torment them; and their mouths restrained from low and swampy spots, whence the devastating bane is obtained. These are circumstances highly conducive to the health, contentment, and the thriving state of sheep, and with the sick, if any such should be, separated from the rest, and penned on the ground already traversed, will fully complete the desired arrangement.

It remains, then, only to show that the progressive condition of the animals, in growth of body and increase of weight, according to their ages, will be as great, or nearly equivalent, under such a system, as they are under those commonly adopted, to stamp the introduction of it a most important national improvement; and I think, from the experience already obtained, there is little doubt that such will be the case, under good and careful management.

It is quite evident that the nutritive qualities of the food of cattle are by no means regulated by their predilections or aversions to it. In some instances they are certainly completely opposed to each other, and it is therefore probable, that where extensive opportunity of choice is allowed, many of the grasses really capable of affording a good supply of food are discarded by the animals, because they are not at the time accustomed to them. It will only be necessary to allude to turnips and to oil cake, which have been frequently pertinaciously refused by animals not habituated to them when young, to establish this proposition; and grass of extraordinary growth or luxuriance, or which has stood long, as well as that from land recently manured, is also generally rejected in favour of a closer and a shorter bite. Does it follow, however, that it is less nutritive? Certainly not. In cutting grass of any description, in the manner above laid down, no opportunity is afforded of this nice selection, and no inconvenience is experienced from the want of it. The unpampered appetites of the animals eagerly receive and consume the homogeneous mass of natural grass with which they are supplied, and knowing no taste beyond it, they are soon reconciled to this alone. The food with which they are supplied may, however, with management, be always supplied to them in a palatable form, and many changes may be rung upon it to increase their relish for it. Salt has been already mentioned, and the advantage of providing it for coarse or luxuriant grass, by which it is so readily absorbed, is both evident and great, as it regards either the health or comfort of the

sheep. Another mode of rendering grass of this kind more salutary and tasteful is, by suffering it to partially wither before it is placed in the racks, by which its character is changed and its sweetness increased. A third method may be named of effecting a similar end, by inducing a very slight fermentation from placing it in heaps; and as sweetness is the first product of this process, so simple a means of producing it may be occasionally resorted to. Under many, or most circumstances, however, no such provision will be required, for where the grass is only of a moderate growth, it will be most readily eaten the moment it is cut; and where forecast is exercised for a due succession, no difficulty whatever need be experienced. Where the grass is too short to be mown, which occasionally, at certain periods of the year will occur, the fold can proceed as it would upon turnips, and the animals allowed to crop the portion enclosed; a more frequent change of fence will then be required, and twice in the day occasionally wanted. Whichever course may be adopted, the labour or expense, compared with the benefits, is trivial, and the interruption to the general business of a farm unworthy of mention. Every thing takes place on the spot where the crop is produced. A boy can supply the food, and dry it, or heap it, or sprinkle it with salt, and the labour required in addition is only the cutting of the food, and the removing of the fence, the manure remaining on the spot which is best entitled to it. Under arrangements such as these, it is, however, highly important that the fence by which the animals are enclosed should be very easy of removal, and where this takes place so frequently, a frame work upon wheels, for the hurdles or other fence to be fixed in, will be both far superior to the common method of folding, and ultimately much cheaper, and the animals will be less likely to be kept back by the labour of bringing them on fresh ground.

Sheep and natural pasture have been chiefly alluded to in the foregoing details; and, perhaps, during the winter months for these they are best suited; it is highly desirable, as far as fine wool is concerned, that our sheep should not be exposed to the dirt of tillage lands in wet and stormy seasons; and the health and comfort of the sheep loudly second the proposition: the feeding off turnips is, however, so highly beneficial, that to attempt to withdraw the practice without sufficient compensation, would be an act of temerity; but, perhaps, even such may be found, and then the advantage of a change may be indisputable.

Tillage land in summer is highly grateful to sheep, and taking the four-field rotation of cropping, it may be frequently practicable to substitute the feeding off the clovers for turnips, and thus exchange a grassy ley for a dirty fallow, on which they are now in winter destined to *want* repose: the turnips might be drawn and carted as required, to the pastures natural or temporary, on which, under this arrangement, the sheep would be wintered. The supply of hay would then be obtained in ample quantities from the fields on which the turnips were consumed, to counterbalance the feeding of the clover crop, which is

usually mown. With such an arrangement in view, the turnip field would generally be allotted adjacent to the winter quarters, and where fields were large, they might be cropped in partitions: the whole turnips would be as easily drawn as the pieces are now taken up, and they would be less dirty for the sheep when eaten on pasture land. The after-grass of the mown pastures would furnish a supply of food through the autumn, and the addition of turnips and a portion of hay consumed upon them, would give almost unexampled luxuriance—the seeds of the hay, instead of being misapplied upon the tillage, would here also be harmless, if not beneficial; *and the summer treading of the surface of the land by sheep on the crop previous to the depositing of wheat, in lieu of winter treading, as preceding the introduction of barley, presents to the intelligent farmer an arrangement desirable for either crop, and advantageous alike for both.*

The same principles which prevail in the feeding of sheep, are, with little variation in this instance, applicable to cattle: enclosed with a moveable fence, proportioned to their size, and shaded and sheltered by sufficient sheds also easily moved, the same economy of both food and manure may be effected; it is, in fact, a cattle yard, in which the animals might be either tied up or suffered to range, always fresh and clean, with the food immediately at hand in summers and adjacent in winter; and at the same time that it would, to a certain extent, supersede the necessity of those expensive out-buildings which landlords sometimes omit to erect, and which certainly are not within the compass or the province of the tenant, it would impart to all the land thus gradually applied to this indispensable purpose, a portion of that strength and power of fertility, which even contiguity to a fixed yard so invariably manifests; the accumulation in which is a nuisance, and from which so large a portion is suffered to escape and run to waste.

The power of obtaining for animals shade in the summer and shelter in the winter months, combined with cleanliness, free circulation of air, and freshness of food, by the system of moveable sheds, offers such facilities to the adoption of soiling, as to introduce it upon quite different terms, and bring it within the scope of natural pastures on which it has seldom before succeeded. Folding by day, without sheds for shade in summer, is a hardship to the animals as great as exposure to the full force of the wintry storm: in attempting to improve upon the system of nature, we must not stop half way, and depriving our flocks and herds of the shade and shelter to which they resort when at liberty, omit to supply them with a sufficient substitution. It is practicable, however, to give a more efficient defence, and by a proper adjustment of the sheds increase the heat or diminish the temperature to a considerable extent, and create a coolness in summer, grateful as due warmth in winter, in a manner which fixed sheds are incapable of yielding.

Diseases of several kinds are likely to be circumscribed by the regularity and arrangement of a system such as this: secure from attack from without, and constantly under the eye of those who feed them,

the slightest symptom of disorder in the animals within may be ascertained, and the subject removed.

Water is at certain periods required for the cattle thus confined, but as with turnips or other roots none is wanted, so with food full of succulence, little if any would be needed here.

That an outlay for sheds, in addition to hurdles or superior fences, would be at first required, is no objection whatever to a plan of this kind: it is not desirable, constituted as mankind are, that important advantages should come to us unsought; but the expense here bears no proportion to the advantage to be derived individually and nationally.

If, however, doubts are entertained as to the adaptation of such means to grazing stock, little hesitation need be felt for those that are kept in store condition, (so large a portion of the whole,) with the provision that has been made for constant food, and shade and shelter; while the economy of manure, the main spring of farming, cannot, surely, fail of obtaining universal assent.

With these details and observations, trusting that the sphere of improvement may yet be thrown wider open in the delightful field of agriculture, in the same way as it has opened in other branches of useful industry—convinced that the system submitted through you to the enlightened society I am addressing is capable, if proved to be correct, of adding to the resources of this great country in most situations, and to an incalculable extent—and desirous that the scrutiny and attention of others may be called to a system which I myself deem so highly important, even before it is fully established by more numerous and lengthened details, I conclude with subjoining, that one hundred and twenty young sheep were kept exactly in the manner described, in an improving condition, on only nine acres of natural pasture, which had been previously mown for hay, from the middle of September to the end of December in the past year, with the addition only of a small portion of hay in the last few weeks of that period.

With this example to evidence the economy and practicability of what has been above submitted, for the judgment of the Society of Arts,

I have the honour to subscribe myself,

Sir,

Your most obedient humble Servant,

GEORGE WEBB HALL.

February, 1829.

To Arthur Aikin, Esq., Secretary, &c. &c.

THE THEORY OF PUTRESCENT MANURES.

Sir Humphry Davy was the first who embodied into a system the principles of chemical science as applied to the operations of agriculture, and which system was first promulgated in a course of lectures delivered before the late Board of Agriculture. In that system was detailed all that was at that time known of scientific agriculture. Among the many other statements in that system occurs the following, in regard to the application of rotten dung. "As soon," says this distinguished chemist, "as dung begins to decompose, it throws off its volatile parts, which are the most valuable and most efficient. Dung which has fermented, so as to become a mere soft cohesive mass, has generally lost from one-third to one-half of its most useful constituent elements, and that it may exert its full action upon the plant, and lose none of its nutritive powers, it should evidently be applied much sooner, and long before decomposition has arrived at its ultimate result." This opinion was promulgated in 1809, and it has till lately received the confidence of most chemists. But experience nevertheless continued to act in direct opposition to this opinion. Manure continued to be applied in "a soft cohesive mass," and it continued to raise large crops; whereas, had it been applied "long before decomposition had arrived at its ultimate result," the result would inevitably have been a loss of crop, manure, and labour.

It is certainly an erroneous assumption to say, the first stage of fermentation in dung must necessarily throw off its most valuable parts. Every dunghill of fresh dung throws off a gaseous exhalation a very short time after it is put together, and the quantity thus thrown off is regulated by the state of the atmosphere. But this exhalation does not consist of the valuable gases; it is a mere evaporation of the water contained in the dung. The same hot haze may be seen flickering over a fallow field in a sunny day in summer. Nobody could with truth assert, that this haze arises from the disengagement of the gases in the dung which had previously been inserted into the soil, when it is clearly nothing more than the evaporation of the moisture in the soil. In Saxony, hay is made by heaping together the cut grass, fermenting it for a short time, and afterwards drying it in the sun; but in this process, nobody would say that the nutritious portions of the grass are dissipated, when it is only the superabundant aqueous portions of the grass which are driven off by heat. To say, therefore, the first stage of decomposition in a dunghill throws off "the most valuable and the most efficient" parts of the dung, is just to say the vapour of water is the most valuable part of dung.

It is true, were the fermentation continued after all the water in the dung was evaporated, a considerable increase of temperature would ensue; and when the texture of the fibrous portions of the manure began to decompose, there would be an evolution of valuable gases. Direct experiment has proved the escape of gases from a heap of dung which has been long fermenting. But what harm accrues to the dung as a manure from the escape of these gases? None whatever. We

are told these gases constitute the food of plants, and if they are permitted to be dissipated by decomposition, the quantity of nourishment in the heap of manure will of course be so much diminished; that if the bulk of the dung-heap be diminished one-half or one-third by excessive fermentation, the quantity of nourishment to the crops will be diminished in a greater ratio. These cautions have long been whispered in the ears of practical men, but they have listened to the advice with a provoking indifference. It is true, and we must admit it, that some of the gases constitute the food of plants, but it does not follow that plants would receive them as food directly as they are disengaged from a fermenting and heated mass; nay, it is probable they would rather reject the food that would injure them. But as plants are not endowed with locomotive powers, they cannot avoid the food which is directly presented to them; they will therefore be obliged to partake of it even in an injurious state, and in thus taking it they die. Accordingly, we invariably find that plants suffer from the contact of fermenting dung, and it is this well known fact, more than from any other circumstance, which deters farmers from applying dung in an unprepared state. It is sometimes applied to the soil, it is true, in an unprepared state, but long before the crop is brought into contact with it, and after it has undergone fermentation in the soil. Though this application of dung is recommended by men of science, it is performed from the very opposite principle which they recommend. They recommend it because the gases arising while the dung is fermenting are absorbed by the soil, and are thence given out for the use of plants; on the other hand, farmers perform it because the fermentation will have ceased before the crop is inserted into the ground. Which of these is the more rational reason? The practical one undoubtedly; for it is surely impossible that the slight covering of earth upon the dung can prevent the escape of the elastic gases, however it may retard fermentation.

We may conclude from analogy, that plants, like animals, have a mode of consuming their food peculiar to themselves. They may not necessarily consume the food in the state we choose to prepare it for them. All they require is, that the materials which supply their food shall be placed in the soil in the state least injurious to them, and within their reach, and they will feed themselves. Now, what is the least injurious state in which dung can be presented to any crop? Experience has always said in "a soft cohesive mass." Recent discoveries show that practice has always spoken in accordance with science. Consequently, this recent concurrence of science is a tardy justification of practice.

The history of the recent discoveries alluded to, which shew the scientific accuracy of practice in applying dung in a rotten state, is this. In 1802, the celebrated chemist and analyst Klaproth, received from Palermo a substance which exuded spontaneously from the bark of a species of elm. To this substance Dr. Thomson gave the temporary name of *ulmin*. It dissolves speedily in a small quantity of water, in

which respect it is like a gum; but when the solution is very much concentrated by évaporation, it is not the least mucilaginous or ropy, nor does it answer as a paste. In this respect *ulmin* differs very essentially from gum. When a few drops of nitric or oxymuriatic acid are added to the solution, it becomes gelatinous, which, when slowly evaporated to dryness, and treated with alchol, and again evaporated, leaves a light brown, bitter and sharp resinous substance. Thus, it appears that ulmin, by the addition of a little oxygen, is converted into a resinous substance. In this new state it is *insoluble* in water. This property is very singular: That a substance soluble in water should assume the resinous form with such facility is very remarkable.* Berzelius has found this curious substance in all barks; Braconnot in saw-dust, starch, and sugar. But what is more to our present purpose, Sprengel and Polydore Boullay have found it to constitute a leading principle in all soils and manures. Sprengel appropriately calls it *humin*, from its existence in all soils, *ulmin* being given to it by Dr. Thomson several years ago as a temporary name.

"Humin appears to be formed of carbon and hydrogen, and the humic acid of humin and oxygen. Pure humin is deep blackish-brown, without taste or smell, and water dissolves it with great difficulty, and in small quantities; consequently it cannot, when pure, be available as food for plants. Humic acid, however, which is not sour to the taste, readily combines with many substances found in soils and manures, and not only renders them, but itself also, easy to be dissolved in water, which in their separate state could not take place. In this way humic acid will combine with lime, potass, and ammonia, in the form of humates, and the smallest portion of these will render it soluble in water, and fit to be taken up by the spongelets of the root fibres. It appears to have been from ignorance of the important action of the humic acid, in thus helping to dissolve earthy matters, that the older writers were so puzzled to discover how lime and potass got into plants; and it seems also to be this chiefly which is so vaguely treated of in older books under the names of *extractive*, *vegetable extract*, *mucilaginous matter*, and the like. Saussure, for instance, filled a large vessel with turf, and moistened it thoroughly with pure water; when, by putting 10,000 parts of it by weight under a heavy press, and filtering and evaporating the fluid, he obtained 26 parts of what he termed *extract*; from 10,000 parts of well dunged and rich kitchen garden mould, he obtained 10 parts of *extract*; and from 10,000 parts of good corn-field mould, he obtained 4 parts of *extract*. Polydore Boullay found that the liquid manure drained from dunghills contains a large portion of humic acid, which accounts for its fertilizing properties, so well known in China and the Continent; and he found it also in peat-earth, and in varying proportions in all sorts of turf. It appears probable, from Gay-Lussac having found a similar acid, the *azumic*, on decomposing the prussic or hydrocyanic acid, and the humic acid may

* Thomson's Chemistry, vol. iv. p. 696.7.

be found in animal blood; and if so, it will account for the utility of blood as a manure for vines, &c. Dobereiner found the gallic acid convertible into the humic*." Such is the history of this remarkable substance, which performs so important a function in the action of putrescent manures, and which is found in abundance in the "soft cohesive mass" of rotten dung. Let us see how it operates in manures.

The chief food of plants consists of the carbonic acid gas and humic acid mixed with water. Every manure is therefore only valuable which contains these substances in the greatest degree, and in such a state as they are most easily available to plants. Now, practice recommends the rotting of every kind of dung, whether simple or compounded, and the reducing it into a uniform dark brown "soft cohesive mass," similar in consistence to fresh peat, so that it may be cut with the spade; because it maintains that dung in this state is much more valuable to crops than fresh dung or mere litter, whatever may have been the quantity of carbonic acid gas which had evolved during its fermentation. Recent discoveries have proved the wisdom of this recommendation of practice, because they have proved that rotted dung contains much more carbonic acid gas and humic acid, weight for weight, than fresh dung. There is, it is true, a loss of bulk in rotting fresh dung, and of an evolution of carbonic acid gas during its fermentation; but the question is not what the volume of carbonic acid gas alone is in dung, but what is the most available state in which the carbonic acid gas in the dung can be presented to plants; and this is the rotted state, because in that state alone it contains the humic acid in quantity. All the black carbonaceous matter in dunghills is the humin ready to be converted into humic acid, which is in fact the cooked state of the food of plants. Moreover, practice finds that fresh dung is injurious to vegetation, and recent discoveries now inform us that this arises from the acridity of the ammonia, which is always present in unfermented dung. Fermentation drives off the acrid ammonia. Fresh dung is found to injure plants by *burning* them, which is a very appropriate term to describe the action of ammonia. In like manner, stale liquid manure is not so good a top-dressing to grass as fresh, or when it is largely mixed with water; because science now informs us, that ammonia becomes concentrated in stale liquid manure, and is therefore in an injurious state for plants; and that it is necessary to mix liquid manures largely with water, in order to dilute the ammonia, and allow the proper action of the humic acid, which exists in large quantity in them. Again, it is not an uncommon practice to cover a dunghill with earth in hot weather, and this is now explained, not as it hitherto has been, that the earth absorbs and prevents the escape of the carbonic acid gas, which it could no more do than a balloon made of gauze could prevent the escape of hydrogen gas; but that a violent fermentation in the dung is checked by the earth partly excluding the atmospheric air and rain water, the oxygen in either of which is indis-

* Rennie's Alphabet of Scientific Gardening, p. 12-13.

pensable to continue the process, it being this oxygen which forms the carbonic acid gas by uniting with the carbon of the dung. The necessity of checking a *violent* fermentation in a dunghill which contains a large portion of horse-dung, is to prevent it being what is technically called "*fyrefangit*," a state of dung which is useless.

In regard to composts, it is found that to mix lime with fresh or rotten dung is to waste it, because, as is now explained, the lime takes up and renders useless the carbonic acid gas which they contain. In like manner, a compost of fresh dung and weeds, green leaves, grass, turf, and green vegetables, without lime, is valuable, because all these substances supply abundance of *humin*. On the other hand, lime promotes the fermentation of peat-earth, dry leaves, and every thing which contains hard woody fibre, and supplies *humin* in quantity.

It is requisite to attend to the seasons of manuring. Dung, in any state, is never applied to the land in winter; it is best applied in spring: it is injudicious to expose it to a hot sun in heaps; and it is improper to allow it to remain a length of time in heaps on the field. These practices are now easily explained, and are quite in accordance with science. In winter there are no crops in the field to which the dung can be applied: in spring, on the other hand, plants and seeds are ready to shoot forth into life; their roots are then most active to devour the nourishment which may be placed within their reach. To spread out rotted dung in hot weather and let it lie, must be to subject its component parts to the highest degree of evaporation; and to allow it to remain in large heaps for a time on the ground, is to give the portions of the ground which are covered by the heaps an undue advantage.

We thus see that science now agrees with that practice which has been pursued for years with unexampled success. It is consolatory to practitioners to think that their experience, though unknowingly to them, has guided them to success on really scientific principles. This agreement of experience and science should teach every one that science *and* experience, and not science alone, ought to be made the tests to try the accuracy of opinions. Unfortunately for the credit of science, the test of accuracy hitherto, in the application of putrescent manures, has not been submitted to practice. It is always for the interest of practice, however, to listen attentively to the suggestions of science. One of these suggestions as a rule to try the value of all sorts of manures, is, that they shall be judged by the proportion of carbonic acid gas and humic acid they contain or may evolve after they have been applied, and also by the quantity of water which they are able to take up and retain. The rule, when confined to carbonic acid gas and water, was supposed to lead to a correct view of the subject, independently of ascertaining the proportion of humic acid. But when the rule was confined to these substances before the discovery of the importance of the humic acid, we see the errors which even men of science fell into. Knowing now the effects of the important principle of humic acid, it ought to be strictly retained as a term in the

rule; because, were the ability to retain water alone taken as a test, bog-earth, the most sterile substance in an undecomposed state, might be decided to be the best of all manures; and were the evolution of carbonic acid gas alone taken as a test, chalk should be an excellent manure,—and so it would always be could it be brought to take up and retain enough of water to dissolve a portion of it, which it can do by means of the humic acid. Now, let us apply these tests to rotten dung. There can be no question that rotten dung is very much superior in imbibing and retaining water, to what is fresh, unfermented, or beginning to ferment. A simple experiment can easily prove this to those who doubt the fact. "With respect to carbonic acid gas, humic acid and the minor materials of the food of plants," says a recent author, "there can be as little doubt of the superiority of rotten dung, which is, in fact, in a state very nearly approaching to the best leaf mould or virgin loam, and though a weighed quantity of fresh dung certainly will yield more carbonic acid gas than when this same quantity is allowed to ferment and rot, in consequence of much of it being given off during these processes, yet the weighed quantity of fresh dung will bear no comparison in this respect with rotted dung. The quantity of humic acid is very considerably greater in rotted dung."* Hence, in treating in future of all putrescent manures, the very important effects of the humic acid must never be overlooked.—*Quarterly Journal of Agriculture.*

SUCCESSION OF CROPS.

As crops of the cultivated plants succeed to each other upon the same ground, a question to be determined is the order in which the different kinds should follow each other.

All plants which are cultivated, and which are carried from the ground where they are produced, tend to render the soil less productive, or, in the language of farmers, to exhaust it.

But the plants which are suffered to decay, or which are consumed by animals on the ground on which they grow, do not exhaust the soil. On the contrary, the decay of the stems and leaves of such plants, either naturally, or by the consuming of them by animals, tends to add those decomposing organic matters to the soil which form one of the elements of its fertility. This process may be imperceptible and slow, but it is that which Nature herself employs to form the soil, as distinguished from what is termed the subsoil.

Sometimes this process of decay is counteracted by the singular natural provision, of a conversion of the decomposing vegetables into a substance which itself resists decomposition—peat. But, with this exception, the tendency of the decay of vegetables upon the surface is to add to the fertile matters of the soil.

* Rennie's Alphabet of Scientific Gardening, p. 55.

This is well understood in the practice of agriculturalists. When the productive powers of a soil have been exhausted by cultivation and the carrying away of its produce from the surface, it is laid down to herbage, in which state the future vegetation which it produces tends, by its decomposition upon the surface, to renovate the productive powers of the soil. Land in this state is said to rest.

When land, however, has been impoverished by successive crops, and has become full of weeds, the laying it down to rest in that state is attended with less beneficial consequences than when the soil has been previously cleaned of injurious weeds, and fertilized by good culture. In the former case, the process of renovation is slow, if perceptible at all; the useless plants increase, and not those which are beneficial and afford food to pasturing animals. Land, when properly laid down to grass, therefore, tends to recover its wasted powers of production. Land not properly laid down has less of this healing property, and may be more full of weeds, and no richer when ploughed up again after a time, than when first laid down. Under good management, however, the laying down of cultivated land to grass and other herbage-plants to be consumed upon the ground, is a mean of resting the soil, and renovating its powers of production; and this mode of recruiting an exhausted soil being always at the command of the farmer, its application is important in practice. It is to be observed also, that the poorer soils require this species of rest and renovation more than those which are naturally productive.

The experience of husbandmen from the earliest times has shown, that the same kinds of plants cannot be advantageously cultivated in continued succession. The same or similar species tend to grow feebly, or degenerate, or become more subject to diseases, when cultivated successively upon the same ground; and hence the rule which forms the basis of a system of regular alternation of crops is, that plants of the same or similar species shall not be cultivated in immediate succession; and further, the same rule has been thus far extended, that the same species shall recur at as distant intervals of the course as circumstances will allow.

All herbaceous plants whose produce is carried off the ground which produces them, may be said to exhaust the soil upon which they grow. But all such plants do not exhaust the soil in the same degree; for after some species the soil is seen to be more impoverished than after others.

And not only do different species of plants exhaust the soil in a a greater or less degree than others, but the same species does so according to the different period of its growth at which the plant is removed from the ground.

When a herbaceous plant is suffered to mature its seeds, it exhausts the soil more than when it is removed before its seeds are matured. All herbaceous plants, therefore, when cut in their green state, that is, before they have matured their seeds, exhaust the soil less than when they remain until they have ripened their seeds. Thus the turnip,

when used in its green state, is one of the least exhausting in the agricultural class of plants to which it belongs; but the turnip, when allowed to remain upon the ground until it has ripened its seeds, is one of the most exhausting plants that is cultivated amongst us; and so it is with the rape and others.

Further, certain plants, by the larger or smaller quantity of manure which the consumption of them affords, are more or less useful in maintaining the fertility of the farm.

When a herbaceous plant is suffered to mature its seeds, and when any part of these seeds is carried off the farm, the plant affords, when consumed by animals, a smaller return of manure to the farm than if the same plant had been cut down before it had matured its seeds, and been in that state consumed by animals. Thus it is with the turnip plant referred to. This plant is sown before midsummer. In the first season it forms a napiform root, and puts forth a long system of leaves. Early in the following season it puts forth a large stem, which bears flowers, and the seeds are generally matured about midsummer. If this plant is removed in the first stage of its growth, that is, after it has put forth its large leaves and formed its bulb, and is then consumed by animals, it returns a great quantity of manure; but if it remains until the second state of its growth, then the consumption of its stems and leaves returns scarce any manure. The juices of the root have apparently been exhausted in affording nutrition to the flower-stem, the flowers, and the seeds.

It is beyond a question, that, in order to bring a plant to its entire maturity, by the perfecting of its seeds, a larger quantity of the nutritive matter of the soil is sucked up by it than when it is brought only to less advanced stages. When crops of plants, therefore, are suffered to arrive at maturity, they are greatly more exhausters of the soil on which they grow than when they are cut down while they are green; and if those seeds are in whole or in part carried off the farm, the crops are exhausters of the farm, as well as of the ground which had produced them. Were the ripened seeds to be wholly returned to the soil, it may be believed that they might give back to it all the nutritive matter which had been derived from it. But, in practice, seeds are employed for many purposes, and are generally carried off the farm which produces them. When this is done in whole or part, the plants produced are in an eminent degree exhausters of the farm, as well as of the soil on which they are grown.

Further, certain plants, from their mode of growth and cultivation, are more favourable to the growth of weeds than other plants. The cereal grasses, from growing closely together, and not admitting, or admitting partially, the eradication of weeds, are more favourable to the growth and multiplication of weeds than such plants as the turnip and the potato, which are grown at a considerable distance from each other, and admit of tillage during their growth, and whose broad systems of leaves tend to repress the growth of stranger plants.

Having these principles in view, certain rules may be deduced from

them, for the order in which the crops of plants in cultivation in a country shall succeed to each other on the same ground.

1st, Crops consisting of plants of the same or similar species shall not follow in succession, but shall return at as distant intervals as the case will allow.

2nd, Crops consisting of plants whose mode of growth or cultivation tends to the production of weeds, shall not follow in succession.

3rd, Crops whose culture admits of the destruction of weeds, shall be cultivated when we cultivate plants which favour the production of weeds. And further, crops whose consumption returns to the soil a sufficient quantity of manure, shall be cultivated at intervals sufficient to maintain or increase the fertility of the farm.

And, 4th, when land is to be laid to grass, this shall be done when the soil is fertile and clean.

These rules may be applied to the plants which form the subject of common cultivation in the fields. In this country, the plants chiefly cultivated on the large scale are,—the cereal grasses, chiefly for the farina of their seeds; certain leguminous plants, as the bean and the pea; plants cultivated for their fibres, as the flax and hemp; for their leaves, roots, or tubers, as the turnip, the cabbage, and the potato; and certain leguminous and other plants for forage or herbage. The plants of these different classes are yet to be described; and they are now only referred to with relation to the order in which they may succeed to each other in cultivation.

The 1st class of these plants consists of the cereal grasses. These are chiefly wheat, barley, oats, and partially rye. All these plants are in an eminent degree exhausters of the farm. They are all suffered to mature their seeds, and are wholly or partially carried away from the farm. Further, from the manner of their growth, and mode of cultivation, they all tend to favour the production of weeds. For these reasons, and on the general principle that plants of the same or similar kinds should not follow in succession, the cereal grasses should not succeed each other, but should be preceded or followed by some crop, which either exhausts the soil less, or admits of a more perfect eradication of weeds.

2nd, The leguminous plants cultivated for their seeds, as the bean and the pea, are all exhausters of the soil. They ripen their seeds, and these seeds are for the most part carried off the farm. Some physiologists suppose that they are less exhausters of the soil than the cereal grasses. It is probable that they do exhaust the soil somewhat less than the cereal grasses. But the essential difference between them, when considered with relation to their effect upon the soil, is, that, from their growth and the manner of cultivating them, they are greatly less favourable to the production of weeds than the cereal grasses. By their broader system of leaves, they tend to stifle the growth of weeds more than the cereal grasses: and further, they admit of tillage during a great part of their growth. This is especially the case with the bean, which is therefore regarded as a useful cleaning crop, and so is culti-

vated in rotation with the cereal grasses, as a mean of preserving the land clean.

3rd. Hemp and flax, which are cultivated chiefly for their fibres, and all plants cultivated for their oils, are exhausters of the soil. They are suffered to form and ripen their seeds, and their stems afford no return of manure to the farm.

The next class of plants, from the large return of manures which the consumption of them affords, may be regarded as enriching or restorative crops, in contradistinction to the others, which may be termed exhausting crops:—

1. The turnip, the rape, and other plants of the cabbage genus, cultivated for their roots and leaves, and consumed upon the farm.

2. The potato, the carrot, the parsnep, the beet, and other plants, cultivated for their tubers and roots, and consumed upon the farm.

3. The leguminous plants,—the clover, the tare, the lucerne, and others,—when cut green for forage, and consumed upon the farm.

The plants of the latter class, namely the leguminous, when mixed with gramineous plants, as the rye-grass, are commonly termed the artificial grasses, but would be more correctly termed the cultivated herbage or forage plants. They are often suffered partially to ripen their seeds, and are made into hay; and in this case they follow the general law, exhausting the soil more than when used green. And when the hay-crop is carried away from the farm, they are to be regarded as exhausting rather than restorative crops.

In speaking of these different classes of plants, the following terms may be employed:—

1. The cereal grasses may be termed Corn-crops.

2. The leguminous plants cultivated for their seeds, Pulse-crops.

3. The turnip, and other plants of the same kind, cultivated for their roots and leaves, may, with reference to the mode of consuming them, be termed Green crops; or, with reference to the manner of preparing the ground for them, Fallow-crops.

4. The potato, and plants of other families cultivated for their roots and tubers, may, in like manner, be termed Green or Fallow crops.

5. The leguminous plants cultivated for green food, as the lucerne and tare, may be termed Green Forage-crops.

And lastly, the mixture of gramineous and leguminous plants cultivated for herbage or green food, may in compliance with common language, be still termed the Sown or Artificial Grasses.

Further, distinguishing these different classes of crops according to their effects upon the fertility of the farm, they might be divided thus:—

1. Corn-crops,—exhausting crops, and favourers of weeds.

2. Pulse-crops,—exhausting but cleaning crops or capable of being rendered so.

3. Green or fallow-crops,—restorative and cleaning crops.

4. Green forage-crops,—restorative and sometimes cleaning crops.

5. The sown grasses,—restorative crops.

Knowing these the general characters of the cultivated plants, we have, in devising a rotation, to cause the restorative and cleaning crops so to alternate with the exhausting crops, as that the land may be preserved fertile and clean. Further, when we find that land cannot be sufficiently cleaned by means of cleaning crops, we must make use of the summer-fallow; and again, when we find that land requires rest, we may lay it down to grass for a longer or shorter time, taking care when this is done that the land shall be in as fertile a state as circumstances will allow, and free from weeds.

The application of these principles will be best explained by adverting to some of those courses of crops which have been found good in practice, both as maintaining or increasing the fertility of the soil, and as admitting of an economical division of labour upon a farm.

The first of these courses is the four-years' course, or four-shift course, as it is sometimes called. This course is of very general application, and forms the basis of nearly all the most approved rotations on the lighter soils and inferior clays of this country.

It consists of a regular alternation of the following crops:—

1st year, Turnips or other green crop, manured.
2nd Corn-crop, as wheat, barley, or oats.
3rd Sown grasses.
4th Corn crop.

In this course, we observe that each exhausting crop alternates with a restorative one; and that, in each year, one-half of the farm is under exhausting, and one-half under restorative, crops.

This rotation is adapted to a large class of soils fit for carrying green crops, though these soils ought to be rather of the better class, in order to admit of a continuance of this course in cases where there does not exist a supply of extraneous manures. When the whole produce of the restorative crops, namely, the green crop and cultivated grasses, and the straw of the corn-crops, are consumed upon the farm, the fertility of the soil will generally be maintained under this course. But when these are partially carried away, a supply of extraneous manures is necessary, otherwise the soil will decrease in fertility, and the course become what is termed a scourging one. This course, although an admirable one for an extensive class of soils, has this defect, that the crops of the same kind return at too frequent intervals, and hence are apt to fall off in quality and productiveness. Under a long continuance of this course, the red clover can often scarcely be made to grow. The land is said to *tire* of the crop, and the expression and the fact illustrate the general principle before referred to, that plants of the same species should not return at too short intervals.

The four-years' course, however, with the defects that attend it, is of very general application. It was derived from Norfolk, and is frequently termed the Norfolk-course, and it is, in a great measure, from its general adoption that the husbandry of that county has become so celebrated.

The summer-fallow may be substituted for the manured green crop in the first year of this course, and then the course becomes:—

1st year, Summer-fallow;
2nd Corn-crop;
3rd Sown grasses;
4th Corn-crop.

The course, thus modified, is adapted to the stiff and humid clays, where turnips and other green crops cannot be profitably raised. The course is defective in this, that the summer-fallow is too frequently repeated; and it has the same defect as the Norfolk-course, as to the frequent return of the cultivated red clover.

Other rotations, founded upon these, are produced simply by prolonging the period for which the land sown with grass-seeds shall remain in grass. When the course is intended to be for five years, the land remains two years in grass, thus:—

1st year, Summer-fallow, or green crop manured;
2nd Corn-crop;
3rd Sown grasses;
4th Grass for pasture;
5th Corn-crop, generally oats.

This excellent course is less severe than the four-years' course, and, requiring less manure to maintain or increase the fertility of the soil, it is better adapted to all soils of inferior quality. It does not yield so great a gross produce as the four-years' course, and therefore, where the soil, or the command of manures, admits of the latter, there is not any reason why it should not be preferred. But in other and dissimilar cases, the five-years' course, as this is frequently termed, will be found to be preferable. Wherever, in this course, the soil is suited to the production of green crops, the first crop of the series should be of that kind. But when the land is not suited to the production of green crops, or when, from any cause, the summer-fallow is to be preferred, then the summer-fallow may supersede the green crop in the first year of the series.

Although the five.years' course, which allows the land to remain two years in grass, is suited to soils pretty low in the scale of fertility, yet it is often necessary, when the soil is poor or exhausted by previous cropping, to allow it a longer rest; in which case, the land, instead of two, remains three or more years in grass.

The four and the five-years' courses are suited, it has been said, to a great extent of land in this country. But the richer clays, as well as the lighter loams of the better class, admit of a more extended and varied range of cultivation; the particular plants to be produced being determined by demand for the produce, peculiarity of local situation, command of extraneous manures, and the like.

When this is the case, it is easy to extend the four-years' course in a manner to comprehend the further plants to be produced. Let it be supposed that the land is of the richer clays, and that it is suited to the summer-fallow, then the course may be:—

1st year, Summer-fallow, manured;
2nd Wheat;
3rd Sown grasses, generally for hay or green forage;
4th Oats;
5th Beans, manured;
6th Barley or wheat.

This is a course deserving of imitation in all the cases suited to it, that is, where the soil is sufficiently clayey and rich, and does not require rest in pasture. Under this course, it will be seen that two-thirds of the farm are under exhausting crops, and one-third in summer-fallow and restorative crop.

A slight deviation can be made on this course without altering the principle of it, namely—

1st year, Summer-fallow, manured;
2nd Wheat;
3rd Beans;
4th Barley or Wheat;
5th Sown grasses, generally for hay or green forage;
6th Oats.

But we can render this course less severe, by allowing the land in grass to remain two years in that state, when the course becomes—

1st year, Fallow;
2nd Wheat;
3rd Sown grasses;
4th Grass;
5th Oats;
6th Beans;
7th Barley or wheat.

In which case we have three sevenths in the restorative crops, and four-sevenths in exhausting crops. It is therefore more severe than the four-years' course, in which two-fourths are in exhausting crops. When the soil is light and fertile, as a sandy or gravelly loam, the summer-fallow of the last mentioned courses may be dispensed with, and any kind of green crop substituted:—

1st year, Green crop, as turnips, potatoes, beet, or the like manured.
2nd Wheat or barley;
3rd Sown grasses;
4th Oats;
5th Pease or beans, manured;
6th Barley or wheat,

Under this course, as before, two-thirds are exhausting crops, and one-third restorative crops. The course requires a good soil. It may be rendered less severe, by allowing the land to remain two years in grass, in which case the course becomes—

1st year, Green crop, manured;
2nd Wheat or barley;
3rd Sown grasses, for green forage or hay;

4th	Grass for pasture;
5th	Oats;
6th	Beans or pease, manured;
7th	Barley or wheat.

In this case we have three-sevenths in restorative crops, and four-sevenths in exhausting crops, in which respect it appears inferior to the four years' course; but it is superior to it in this, that the crops are more varied, and if we shall make wheat only once in the rotation, it will fulfil in an eminent degree this condition, that two crops of the same species shall return at as distant intervals as possible.

These several courses illustrate the principle of a good system of rotations, as applicable to the plants commonly cultivated in this country, and they are all capable of being reduced to practice upon the farm. They may serve as the basis of other courses, where plants not enumerated here are to be introduced into the course.—*Low's Elements of Practical Agriculture.*

ON THE EXCRETORY FUNCTION OF PLANTS.

The following interesting paper containing a detailed account of the experiments of M. Macaire, corrobative of the views of M. de Candolle, on the excretory function of plants is extracted from the 9th No. of the Field Naturalist, from a translation by Professor Rennie, from the 5th volume Mémoires de la Societé de Physique et d'Histoire Naturelle de Genêve.

For a considerable time, M. De Candolle has been led to form a particular theory respecting the rotation of crops, founded on the hypothesis, that the roots were the seat of secretions of an especial nature. Some facts, already given in the *Flore Francaise* by this learned naturalist, seem to have furnished him with the first opportunity of turning his thoughts to this important subject; he thus expresses himself, p. 67. "M. Brugmans, having placed some plants in dry sand, saw some small drops of water exude from the extremity of the radicles." And further on, in p. 91: "In fine, the roots themselves in some plants present particular secretions; this may be observed in the *Carduus arvensis*, the *Inula Helenium*, the *Scabiosa arvensis*, several *Euphorbias*, and several of the *Succories*. It appears that these secretions of the roots are only parts of the juices, which not having served for nourishment, are rejected when they arrive at the inferior parts of the vessels. Perhaps this phenomenon, which is not easily perceived, is common to a great number of plants. MM. Plenck and Humboldt conceived the ingenious idea of seeking from this fact the cause of certain habits of plants. Thus, we know that the thistle is injurious to oats, the *Euphorbia* and *Scabiosa* to flax, the *Inula betulina* to the carrot, the *Erigeron acre* and tares to wheat, &c. Perhaps the roots of these plants give out a matter which is hurtful to the vegetation of others. On the contrary, if the *Lythrum salicaria* grows freely near the willow, and the branching *Orobanche* near the

hemp, it is not because the secretions from the roots of these plants are beneficial to the vegetation of the others ?"

Extending these ideas still further, and applying them to the theory of the rotation of crops, both in his public lectures and in his Vegetable Philosophy, M. De Candolle admits, that every plant, in ejecting all the moisture that extends to the roots, cannot fail to eject also such particles as do not contribute to nourishment. Thus when the sap has been spread by circulation throughout the vegetable, elaborated and deprived of a great quantity of water by the leaves, and then redescending has furnished to the organs all the nourishment it contained, there must be a residue of particles which cannot assimilate with the vegetable, being improper for its nourishment. M. De Candolle asserts that these particles, after having traversed the whole system without alteration, return to the earth by the roots, and thus render it less proper to sustain a second crop of the same family of vegetables, by accumulating soluble substances that cannot assimilate with it; in like manner, he observes, that no animal whatever can be sustained by its own excrement. Besides, it may also follow that the action even of the organs of a vegetable converts the mixed particles into substances deleterious to the plant which produces it, or to others, and that a portion of this poison is also rejected by the roots. Some experiments which I had formerly the honour of communicating to the Society, have shewn that, in fact, vegetables may suffer from the absorption of the poisons which they themselves furnish. The continual elongation of the roots renders the effect hurtful not to the same generation of plants; it is the following of the same species which suffers from it, while it is possible to imagine that, on the contrary, these same excrements will furnish wholesome and abundant nourishment to another order of vegetables. The examples drawn from vegetables here offer themselves again with the force of analogy which is very remarkable. It was still, perhaps, necessary to this very ingenious theory, which accounted so reasonably for most of the facts obtained, to be more clearly confirmed by the results of direct experiments; and by the invitation of M. De Candolle I endeavoured to obtain them. The thing was, however, not very easy, and my first attempts were unavailing. I first strove to obtain the supposed exudation directly from plants plucked up by the roots; but, with the exception of some very doubtful cases, it was impossible ever to obtain any sufficient quantity, and the rapidity with which the plants perished in this state destroyed all chance of succeeding by this means. I afterwards attempted to sow the seeds in substances purely mineral, such as pure siliceous sand, pounded glass, &c. Also on clean sponges, white linen, &c.; but although they germinated well, the existence of the plants was always short and precarious, and when I endeavoured to collect their exudation by the use of earths, I found that the decomposition of the refuse from the seeds gave the same character to the whole of them, and that a sort of vegeto-animal substance was always obtained, of which it was impossible to mistake the source, and

which entirely concealed the results of the real exudation, if any were present in plants so imperfectly developed. As a last resource, with the use of rain water, the purity of which I had ascertained by the usual reactives, and which left no residue after evaporation, I endeavoured to preserve plants that were entirely developed. Their roots being taken from the ground with the greatest care, I washed them minutely in rain water to remove all the mould, and when they were entirely cleansed from all impurity, they were dried and placed in phials with a certain quantity of water. I soon observed that they flourished in it, developing their leaves, blossoming, and, after some time, giving by the evaporation of water in which the roots were plunged, and by the reactives, evident marks of exudation by the latter. Much time is required for the studying a great number of families, and at present I am able to present to the Society only a kind of preface to a more complete work. I have, however, seen the phenomenon repeated with a sufficient number of vegetables, and agree with the author whose theory of the rotation of crops is the basis of my observations, in considering it nearly general, at least among all the phanerogamous vegetables.

Vigorous plants of *Chondrilla muralis*, when placed in rain water filtered, having their roots first cleansed as I above described, vegetate and bloom freely. These were thrown away when in full bloom, and replaced by fresh ones every two days, to allow no time for a change of regimen. After eight days, the water acquired a yellow tint and a strong odour very similar to that of opium, and a bitter and rather a pungent taste; it precipitated in small brown flakes the solution of subacetate and neutral acetate of lead, rendered turbid a solution of gelatine, &c., and by slow evaporation deposited a residuum of a brown-reddish colour, which I shall examine hereafter, and which leaves no doubt that the water was perfectly free from any observable substance whatever. In order to ascertain whether this substance was produced or not from the vegetation of roots, I steeped, during the same time, the roots only of the *Chondrilla*, and in another phial, the stalks only, cut from the same plant. They continued fresh and in flower, but the water was not charged with any remarkable colour, had no taste, nor smell resembling opium, did not precipitate the acetate of lead, and contained scarcely any thing in solution. It was now clear to me that the produce obtained from the entire plant was the result of exudation from the roots, which took place only while the vegetable followed its natural course. The same experiments repeated on several other plants produced similar results, as will be seen when I speak of the produce of a small number of families which I have had time to examine. When once assured that plants rejected by their roots the parts improper for their nourishment, it remained for me to ascertain at what time of the day the phenomenon took place. For that purpose I steeped a vigorous plant of the kidney bean (*Phaseolus vulgaris*) with the root in rain water during the day; at night the plant was taken out, washed carefully, dried, and replaced in another jug

full of rain water: the experiment continued eight days, the plant continuing to vegetate with great vigour. On examining the two liquids, I found in both evident marks of the excretion from the roots; but the water in which the plant had vegetated during the night contained a considerably greater quantity. Both were clear and transparent; the experiment being repeated many times on plants of different natures, produced always similar results. I am convinced that by causing artificial night for the plants during the day, the excretion of the roots would be instantly much increased; but in all the plants that I have tried, I always found that it continued slightly during the day. As it is well known that by day the action of the light causes the roots of the plants to absorb the liquid which contains their nourishment, it is natural to suppose that the absorption would cease during the night when the excretion takes place.

It appeared probable that by means of the roots the plants might throw off the substances which they had imbibed, which were injurious to vegetation. To satisfy myself on this point, and at the same time, as the result was another means of verifying the existence of the excretion of roots, I tried the following experiments: some plants of annual mercury (*Mercurialis annua*), carefully taken up, and washed with great precaution in distilled water, were so placed that a portion of their roots was plunged in a slight solution of acetate of lead, and the other portion in pure water. They continued to live very well during several days; after which the pure water evidently precipitated the black hydrosulphate of ammonia, and consequently had received a certain quantity of salt of lead, rejected by the roots which were soaked in it. Groundsel (*Senecio vulgaris*), cabbages, and other plants, placed in the same manner, produced the same results. Some plants, which were placed in a slight solution of acetate of lead, lived very well during two days, after which they were taken out. Their roots were washed in a large quantity of distilled water, carefully dried, again washed in distilled water, which precipitated no hydrosulphate, after which they were left to vegetate in rain water: in two days the reactives demonstrated in the water a small quantity of acetate of lead.

The experiments were made in lime water, which being less hurtful to vegetation than acetate of lead, was preferable for the object sough after. When part of the roots were steeped in lime water, and part in pure water, the plants lived very well, and the water considerably whitened the oxalate of ammonia which demonstrated the presence of lime. Also a plant that had been kept in lime water, and washed until the water no longer precipitated the oxalate of ammonia, then transferred into pure water, after some time discharged a great quantity o lime, which was demonstrated by the reactives.

I repeated the same trials with a slight solution of sea salt, and the nitrate of silver also demonstrated that the salt, which the plant had imbibed by absorption, was partly ejected by the same roots which had imprudently admitted it.

When speaking to M. De Candolle of these results, he related to me

a curious fact which he had himself observed. The plants that are cultivated near the sea for the produce of soda, sometimes thrive very well at a great distance from the ocean, provided they are placed within the influence of the sea air, which, it is well known, transports the particles of salt with which it is charged to a great distance. M. De Candolle was persuaded that the land where the kali thus placed had grown, contained more salt than the land adjoining; so that, instead of extracting it from the earth, these plants appeared to have furnished it by the exudation of their roots. Reflecting on this experiment, I imagined that I could perform it myself on a small scale with common plants, and I placed the roots with the plants of the groundsel, swine thistle (*Sonchus oleraceus*,) mercury, &c. in rain water, and proceeded to bathe the leaves with a solution of sea salt. My solution being too concentrated acted forcibly on the leaves, I diluted it with water, and with a pencil touched the lower part of the leaves and stalks, I even moistened all the green part of the plant, but the reactives never indicated any trace of salt rejected by the root, although the plants had flourished. Hence it appears, that either solutions of salt cannot imitate the proceedings of nature, or that perhaps the soda vegetables alone have the power of absorbing the marine salt, and of rejecting a portion of it by their roots. I should like very much to be able to repeat my experiment on a *Mesembryanthemum* or a *Salsola*. There is, then, no doubt that the plants have the power of rejecting by their roots those soluble salts injurious to vegetation, which are found in the water which they absorb; though but a small portion of these salts appeared in the residuum which I obtained in my own experiments, because the plants, imbibing only pure water and carbonic acid, could reject by their roots only the small quantity of salt which they contained at the time they were taken out of the earth. I could gather little more than the result of the action of their organs on the aliment, not of foreign bodies, which only spread through the vegetable system without being decomposed. I shall now enter into some details on the small number of families which I have examined; each of them has produced results nearly similar in the divers individuals or kinds under experiment, but unhappily the number is very small.

Leguminosæ.—The only plants examined of this family were kidney beans, pease, and beans of the species generally cultivated in this country. These plants exist and develope themselves extremely well in rain water. After they have vegetated in it some time, the liquid, when examined, has but little taste, and the smell is slightly herbaceous; it is clear, and scarcely coloured by the kidney bean, but turns more yellow with the pea and common bean; it precipitates the acetate of lead, and nitric acid re-dissolves the precipitated gum without effervescence; nitrate of silver gives a slight precipitate soluble in acid, (carbonic acid); oxalate of ammonia renders it turbid; the other reactives cause no change. By slow evaporation a yellowish or brownish residuum is obtained, more or less abundant, according to

the plant under experiment, increasing in this order: kidney beans, peas, beans. In all other respects these residua are similar to each other. Ether separates an oily substance; alcohol nothing, and a substance remains analogous to gum and a little carbonate of lime.

In the course of the experiments on these plants, I perceived that when the water in which they had been kept was charged with much excrementitious matter, the fresh flowers of the same species that were put into it faded quickly, and did not live well in it. To ascertain if this resulted from the want of carbonic acid, although they might draw it from the air, or from the effect of the matter excreted, which these plants refused to absorb, I replaced the leguminous plants by those of another family, especially that of corn. The latter lived in it, and the yellow colour of the liquid diminished in intensity; the residuum was less considerable, and it was evident that the new plants had absorbed a part of the matter excreted by the former. It was a kind of rotation of crops in a bottle, and the result tends to confirm the theory of M. De Candolle, of which I spoke at the commencement of this memoir. It is not impossible that, by trying this experiment on a great number of plants, we may arrive at some results which may be applicable to the practice of agriculture: for example, by supposing, as I feel disposed to believe by my trial, that the exudation from the roots of cultivated legumes contributes to the nourishment of corn, I should be disposed to conjecture, according to the relative quantity of these exudations, that the bean will produce the finest wheat, then the pea, next to that the kidney-bean. I am not sufficiently a practical agriculturist myself to know if experience has confirmed this view of the fact.

Gramineæ.—The plants examined were wheat, rye, and barley.

These plants do not thrive so well in rain-water as the *Leguminosæ*, and I suppose that this difference arises from the great quantity of mineral substances, especially silex, which they contain, and which they do not imbibe from pure water. The water in which they have vegetated is very clear, transparent, without colour, smell, or taste. The reactives demonstrate the presence of salts, muriates, and carbonates, alkaline and earthy; and the residuum from evaporation is scanty and but slightly coloured, containing but a very small proportion of the gummy matter, no oily matter, and the aforesaid salts. I should be led to believe that the exudation from the roots of these plants scarcely tends farther than to reject the saline matter which is foreign to vegetation.

Chicoraceæ.—The plants examined were the *Chrondrilla muralis* and the *Sonchus oleraceus*. They live very well in rain-water; the latter acquires a clear yellow colour, a strong odour, and tastes bitter and somewhat virous. It precipitates abundantly brown flakes of neutral acetate of lead, and renders turbid a solution of gelatine. Evaporated slowly, the liquor, when concentrated, has a very strong and persistent taste. The residuum of a reddish brown, by boiling absolute alcohol, partly dissolves; the alcohol evaporating leaves a yellow, slightly brown,

substance, of a very bitter taste, soluble in water, alcohol, and nitric acid, precipitated in brown flakes from its solutions by nitrate of silver, and appears to be very analogous to the bitter principle of the English chemists. The residuum, re-dissoved in water, has a very strong virous taste, similar to that of opium; it contains tannin, a brown gummy extractive substance, and some salts.

Papaveraceæ.—Plants of the corn poppy (*Papaver Rhœas*) cannot live in rain-water; they fade in it immediately.

The white poppy (*Papaver somniferum*) will exist in it; the roots impart to the water a yellow colour; it acquires a virous odour, a bitter taste, and the brownish residuum might be taken for opium. This plant is one of those of which I cut the roots from the stalks, and soaked them separately, and which imparted to the water none of the properties which it acquired from the entire living plant.

Euphorbiaceæ.—The plants tried were the *Euphorbia Cyparisias* and *E. Replus*. These are the euphorbias on which Brugmans says he had observed the phenomenon of small drops oozing from the roots during the night. Possibly I did not adopt the right method, as I could not verify the fact by my own observations. The euphorbias vegetate extremely well in rain-water; the liquor becomes slightly coloured, but acquires a strong and persistent taste, especially after it is concentrated by evaporation. Boiling alcohol dissolves almost all the residuum, which has but little colour, and by evaporation deposites a granulous substance, gummy, resinous, yellowish, white, very acrid, and unpleasant to the throat.

Solaneæ.—The only plant of this family that I had time to vegetate is the potatoe. It lived well in rain-water, and developed its leaves. The water, not coloured, leaves very little residuum, and the taste is very slight; which makes me think that the plant is one of those of which the excretions are very trifling, and scarcely perceptible. But this conclusion is drawn from a single and very short experiment made on a plant scarcely developed.

In concluding this memoir, which should have contained the examination of more families and individuals had the time permitted, I shall recount that the results deduced are: First, That most vegetables exude by their roots substances useless to vegetation; second, That the nature of these substances varies according to the families of the vegetables that produce them; third, That some being pungent and resinous may hurt, and others being sweet and gummy may contribute to, the nourishment of other vegetables; fourth, That these facts tend to confirm the theory of the rotation of crops suggested by M. De Candolle."

MEMOIR OF THE LATE MR. ELLMAN.

A memorial of JOHN ELLMAN will not unfold curious discoveries to the speculative philosopher, nor display stirring incidents to the lover of exciting adventure; but it will present a more useful, though less

imposing prospect—the undeviating and successful devotion of an honest and honourable man to a pursuit, alike essential to the well-being of the community and the power of the state, but a full and complete life of Mr. Ellman must comprise a progressive history of English Agriculture during the last sixty years, for with every association or society formed for the improvement of cattle, the advancement of agricultural knowledge, and the reward of labouring industry, he was intimately connected,—and from his exertions, indeed, most of them derived their existence.

JOHN ELLMAN, the son of Richard and Elizabeth Ellman, was born at Hartfield, a small village near the town of East Grinstead, in the county of Sussex, on the 17th day of October, 1753. His father, Richard, occupied a farm in the parish of Hartfield, at the time of his son's birth, and continued in it until 1761, when he removed to Glynde near Lewes, in the same county, where he died and was buried in 1780; when he was succeeded in his farm by John, the subject of the present memoir, who held it for a period of more than fifty years. Richard Ellman, the father, is reported to have been a man of sound good sense, but, as was not unusual among the farmers of his day, he undervalued book learning, and taught his son John the theory of agriculture in the labours of the field. The writer of this memoir was told by the late Mr. Ellman himself that he was allowed by his father only two winter quarters at school, and he concludes a letter to Arthur Young, in 1789, in the following characteristic manner: "As I have drawn this account to so great a length I will conclude, hoping you will excuse my manner of delivering my sentiments, for I have spent much more time between the plough handles than in a grammar school." At a subsequent period, when he had attained manhood, Mr. Ellman, in his zeal for improvement, read in the winter evenings with Mr. Davies, the vicar of Glynde, whose daughter he afterwards married, and who survives to deplore her irreparable loss. Often have we heard Mr. Ellman lament his want of a more liberal education, and powerfully contrast his disadvantages with the opportunities for instruction, enjoyed by the present generation. His facility, however, of recording his experience clearly and perspicuously is a matter of congratulation to his successors, for his knowledge was far too valuable to be "interred with his bones;" and as Lord Carrington well remarked, in an address to the Board of Agriculture in 1803, "a sufficient degree of agricultural knowledge is rarely united to the power of explaining it with perspicuity and method." Any one who has at different times tried by the plainest questions to elicit information on almost any subject in detail must feel the force of his lordship's keen observation.

On the 27th day of January, 1783, Mr. Ellman married, at Hartfield, Elizabeth Spencer, who died December 9, 1790, leaving issue, John, who was born in 1787, and now lives at Glynde in the farm so long occupied by his father. Mr. Ellman received no fortune with his bride, for the small one which was tendered by her parent he liberally returned for the benefit of some of his wife's relatives who

had fallen into pecuniary difficulties. We mention this because in so doing we cannot be considered as impertinently intruding upon domestic privacy, nor can the narration of this noble act wound the feelings of any, and at the same time we feel that a higher duty than delicacy has devolved upon us—the task of commemorating so high-minded a man as Mr. Ellman, who was in very deed and truth from the cradle to the grave the architect of his own fortune.

In 1784, that enterprising and estimable man, the late Arthur Young, projected a work, which for a series of years he continued to publish under the title of "Annals of Agriculture;" and the tours which he personally made to collect materials for, and invite contributions to this work, were the first travelling inquiries into agriculture made public in this kingdom. In 1788 Mr. Young visited Glynde; and speaks in these disparaging terms of Sussex husbandry: "as to the tillage of the country, it has not one feature that deserves any attention." Let us point out here how, in agriculture as in breeding, Mr. Ellman rose superior to his fellows and the evil examples which surrounded him, surmounting, by perseverance and individual industry, the prejudices, nay, in reference to the period to which we have gone back, we may say the barbarous ignorance of Crowborough and Ashdown Forest. We have a letter before us, written by Lord Bridgewater to Mr. Ellman in 1812, soliciting him to attend the Shropshire Agricultural Society as a judge for the inspection of farms, and to award the premiums to the candidates for prizes, and in 1819 the Board of Agriculture awarded to our departed friend the gold medal for the best cultivated farm in Sussex. The same volume of the 'Annals' contains a statement by Mr. Ellman himself, of the expence and produce of a flock of five hundred and sixty South Down ewes, stating the average for the last seven years, to which we refer our readers, as not only an interesting statistical memorial of old date, but useful to satisfy the public as to the profit of sheep generally, and to guide them in their choice of the best breed. The superiority of the South Downs is very manifest. The close of the year 1788, and the commencement of 1789, was marked by a severe frost, to ascertain the effects of which on crops and cattle, Arthur Young addressed a string of queries to his correspondents, and among them to Mr. Ellman, whose answer may be found in the 'Annals," XII. 152. As Arthur Young's tours suggested the important surveys subsequently made under the direction of the Board of Agriculture, so his system of circular inquiries was adopted by that body, whose labours wrought so much public benefit, though coldly encouraged by Parliamentary supplies. In some notes taken by Arthur Young in Sussex, in 1791, he asks why "this most intelligent and successful breeder of sheep has not given equal attention to cattle.*"

The prizes successively gained by Mr. Ellman for horned cattle give the best answer to this question; and so shortly after this date as 1797, we find the late Earl of Darnley writing to Mr. Ellman for some of his

* Annals of Agriculture, XV. 430.

Sussex oxen, and placing implicit reliance on his judgment in selection; and in the same year Lord Egremont thus writes to him: "I was at the Duke of Bedford's, at Woburn, lately, who has got a pair of Devonshire and a pair of Herefordshire oxen, which were turned out of work last spring, and are now fatting together, and he wants a pair of good Sussex oxen to put with them for an experiment. I desired Mr. Clayton to look for two good ones for this purpose, as it is for the interest and credit of the county that they should be the best possible. He tells me that one ox of yours is the best he has seen. I would rather not send any than they should not be capital ones, as the credit of the whole breed is concerned in this experiment." Mr. Ellman's quick discernment of the points of any animal was remarkable; and an experienced breeder for the turf once observed, that if Mr. Ellman would only apply to horse flesh, and *be a little less open and honest*, he would beat all the men he knew. But his judgment and discrimination were conspicuously shewn in his devoting a greater share of attention to the improvement of South Down sheep than Sussex oxen, for the former, taking all their qualities fairly into account, excel, for general purposes, any breed in Great Britain; and upon them, therefore, Mr. Ellman expended his chief care and pains, but no attention can ever bring the native Sussex breed of horned cattle to an equality with those of several other counties.

In July, 1792, Mr. Ellman accompanied Arthur Young in a tour to view the mode of grazing in Romney Marsh and East Kent: the result of their observations may be found in the 'Annals of Agriculture,' vol. XIX. We regret that our limits prevent us from doing more than referring to an interesting letter on sheep from Mr. Ellman to Arthur Young in 1793.—(Annals of Agriculture, XX. 172.)

In Mr. Ellman we perceive a man who seemed to live but to diffuse comfort and plenty around him, not hoarding up in secrecy the fruits of his experience to gain private wealth or gratify personal vanity, but candidly imparting his information to all who sought it, distributing his bounty to his labourers and his hospitality to all who thronged his board; offending not the high-born and noble, who at this period began to frequent his house, with intrusive airs of equality, nor his inferiors by that arrogance too often displayed by those suddenly elevated to wealth or distinction—we see such a man, so blameless and so bountiful, assailed by mean envy, that basest passion of our nature, and misrepresented by calumnious detraction. Alas! experience teaches those who have lived long and observed much, that the infliction is inevitably incident to merit, and though painful, still are its uses, like those of adversity, blessed, and present the surest test of manly fortitude, without which we lack a guarantee for the permanent existence of any social virtue. Soft and kind-feeling natures sicken and sink beneath the venom; the fretful grow despondent or too irritable for the despatch of business; the reckless lose all self-respect: they laugh and are neglectful. The truly wise and good man expects the villainous attack and calmly lives it down—so acted Mr. Ellman.

In a letter from Lord Egremont to Mr. Ellman, dated June, 1797, we find the following words :—" I cannot conclude this letter without expressing my admiration of the very liberal support which you gave to every measure which was proposed for the general diffusion of improvement, in which your conduct affords a brilliant contrast to the narrow and illiberal attempts at monopoly and imposition in the well-known breeders of Leicestershire and the midland counties." And an agricultural tourist through Sussex in 1793, thus writes to Arthur Young :—" When I arrived at the pretty village of Glynde, I was much disappointed at Mr. Ellman's absence, having all along promised myself great pleasure in seeing his sheep, &c. ; however, knowing Mr. Bakewell had some kind of connection with Mr. Ellman, I could not tell but it might be reckoned an unhandsome thing to interfere with the servant in his master's absence, and I absolutely refrained from even looking over a hedge, which, I am sorry to say, in Leicestershire would be deemed a great and lasting affront*."

Mr. Allen, of Suffolk, the writer of the above, little knew Mr. Ellman's character when he thus expressed a fear of his participating in the narrow jealousies of his great Leicestershire rival. On the contrary, he disclosed all his successive discoveries in the mode of breeding with unreserved frankness, and carried on all his operations openly before the eye of any spectator who might please to witness them. A generous communicativeness was, from youth to old age, a part of Mr. Ellman's character, and we could publish, if we pleased, several hundred letters from different noblemen and gentlemen thanking him for instructing their stewards and bailiffs in the best modes of management attained by himself through years of toil ; and we have one now before us from Lord Egremont, introducing to his notice Mr. Bakewell's own nephew, to whom Mr. Ellman's sheep and stock were shewn without reserve, at a time when, on Mr. Ellman's visits into Leicestershire, Bakewell hid his best rams in out-houses and corners that no hint might be gathered from them, for the amelioration of the much-envied Glynde flock. Justice to Mr. Ellman's memory has compelled us to make remarks which, though true, may savour of severity : we will not enlarge upon them, but proceed to a few comments founded on the extracts we have made touching the South Down sheep. Sir John Sinclair has observed that sheep would be brought to perfection were it possible to unite in the same animal the fleece of the Spanish, the carcase of the Bakewell, and the constitution of the South Down breed. In the absence of an animal exhibiting a combination of all these qualities we must be content with that which for general purposes is best ; and considering their hardiness and ready adaptation of themselves to almost any climate and pasture, we may safely pronounce the South Down to be preferable to any single breed in Great Britain. It was for some time questioned whether South Down sheep could bear hardships in situations where it has been supposed only a mountain breed can exist in winter ; and not many years ago we heard the proposal of

* Annals of Agriculture, XX. 403.

an intelligent Sussex breeder to import South Downs into Wales treated with ridicule. In the thirty-third volume of the 'Annals of Agriculture,' some experiments made by Sir John Buchanan Riddle and Mr. Ellman shew the hardiness of the South Downs to demonstration. Arthur Young, in a letter to Mr. Ellman in 1793, speaks of a "furious report being raised against South Down sheep for being tender," but in a very few years these reports were dissipated; and so soon after this date as 1806, we find that excellent farmer the Earl of Bridgewater, who regularly visited Mr. Ellman, and corresponded with him on agricultural topics, from the period when, as Colonel Egerton, he was engaged in military duty up to within a few weeks of his death, writing thus,—

"I have just taken a farm into hand upon the edge of that bleak down near Ivinghoe, and as it is awkwardly situated for the carriage of manure, and perhaps a little worse than the farming you took notice of in your way to Woburn, every thing must be done by sheep. I shall be obliged to you, therefore, to inform me if you know where I am most likely to get about three hundred very hardy wethers turned of two years old. As they would be a flock to work hard, and to make off afterwards, I must not so much stand for appearance, provided they are healthy and hardy; but they must be South Down breed. looking upon them as the most hardy, and think they will bear the cutting winds the best."

The result proved the accuracy of his Lordship's judgment, and were it necessary to multiply testimonies in support of a fact we believe now generally admitted, the hardiness of the South Down breed, we might quote the letters of the late Lords Sligo, Darnley, and Londonderry, when Lord Castlereagh, to Mr. Ellman, when applying for sheep to transport to Ireland, invariably insisting on their fitness for mountain climates and pasture. Mr. Bakewell said the Dishley breed would endure mountain climate *if* they had enough to eat, so Archimedes proposed to move the globe we dwell on from a given fulcrum, but the practical superiority of the South Downs is shewn in their endurance of mountain cold on mountain diet. Lord Sligo was of opinion that the South Downs, in their improved state, were of the same kind as the neglected native breed of Ireland and also of Scotland, and, acting on this opinion, never, during his life, remitted his exertions to introduce them into his native country. He wrote almost a volume of letters to Mr. Ellman on the subject, who used to send him over not merely the best rams, but also ewes, and frequently English shepherds. Had this latter most important accessory to a flock always been imported by the noble Marquis from England it would on one occasion have saved him a valuable ram. When the present Duke of Bedford was Lord Lieutenant of Ireland, he was once, when dining with Lord Sligo, earnestly recommended to taste a fine haunch of Glynde mutton, to which his Grace, himself a breeder and admirer of South Downs, and well acquainted with Mr. Ellman, readily acceded; but no politeness to his noble host could induce him to finish the slice, or say it

was otherwise than rank in flavour and terribly tough. On inquiry, the disappointed Marquis ascertained that his shepherd, who had been ordered to kill the *best* South Down sheep, had, in accordance with the doctrines of Political Economy, which estimates every thing at its market price, actually slaughtered for the vice-regal banquet a ram for which Lord Sligo had a few weeks before paid Mr. Ellman two hundred guineas!

In the year 1794, December 15, Mr. Ellman for a second time entered the married state, and the object of his choice was Constantia, the daughter of the Rev. Thomas Davis, vicar of Glynde. This union, which subsisted for nearly forty years, was productive of a numerous family.

Hitherto we have noticed Mr. Ellman prosecuting in retirement his agricultural improvements, and gradually winning distinction; we now approach the period when he more decidedly came forward as a public character, and began to diffuse abroad, for the benefit of a larger circle, the fruits of his experience. So early as the year 1786 the wool-growers of Sussex were indebted to that enterprising nobleman, the late Lord Sheffield, for the establishment of an annual wool fair at Lewes. Previously the mode of buying and selling wool was left to the caprice and uncertainty of individuals, and nobody knowing the fair price; every one sold for what he could get, which necessarily left the seller at the mercy of the stapler, better acquainted than himself with the state of the general markets. His Lordship, by promoting the institution of this fair, and honouring it for a series of years with his presence, collected the flock-masters together, and thus secured them a proper price for their wool. But this indefatigable nobleman, whose life was actively devoted to the furtherance of every object of national utility, not merely attracted the neighbouring gentry to these fairs by his presence, but throughout the year exercised an incessant vigilance in collecting information from every quarter relative to the wool trade, and submitted his facts, thus accumulated, to the meeting, in the form of a carefully-prepared and printed report. This practice Lord Sheffield continued until very shortly before his death, in May, 1821, and for many years maintained an uninterrupted intercourse with Mr. Ellman, whom he consulted on every subject connected with his own patriotic views.

About this time, too, there was annually held a small sheep fair at Selmeston, near Firle, a village in the neighbourhood of Lewes, when Lord Egremont—whom we can scarcely presume to praise, for no eulogy of ours can adequately shew forth his merits—instituted one near Petworth, and encouraged improvements in breeding by generously distributing prizes, on the best mode of doing which, and other points connected with the undertaking, he consulted Mr. Ellman in 1795. In his rides to and from Petworth, it occurred to Mr. Ellman's ever-working mind that a fair on a larger scale would tend to public benefit. His thoughts were communicated to Lord Egremont, who, from its inception, encouraged the plan—of which indeed he had

already supplied the model—and answered Mr. Ellman's first proposal with his habitual generosity. "If," writes this incomparable nobleman, "there is any thing in my possession, either in cattle or sheep, or any other thing that you would like to try, I shall be very happy, if you will allow me to supply you." On the 11th of October, 1796, a meeting was held at Lewes, when a subscription was entered into for distributing prizes to the most successful breeders of cattle, and also for the more important object, the reward of industry among the labouring poor. The nature and destination of the different prizes, and the resolutions for the promotion of the objects of the projected society, were advertised in the county papers, to which in the following week Lord Egremont wrote an admirable reply of encouragement, and promised support, from which his Lordship never for one instant departed during the existence of the society, whose founder, Mr. Ellman, he again and again cheered on to perseverance when ready to give way before the attacks of ignorance, jealousy, and misrepresenting malice.

The progress of the Sussex Agricultural Society may be traced from year to year in the 'Annals of Agriculture,' where also are recorded Mr. Ellman's prizes, which he at last obtained with such facility that he became a giver of premiums himself, and generously refrained from exhibiting his own stock that other less successful breeders might be encouraged to perseverance in improvement.* The example of Sussex was followed by many other counties, and innumerable were the letters which Mr. Ellman received soliciting the benefit of his suggestions and advice, which were never withheld, for throughout his life he seemed to think his first duty was to extend the fruits of his experience as widely as possible; and if we might judge from the efforts he made, therein consisted his chief pleasure. The Emperor of Russia ordered two of Mr. Ellman's rams through his Majesty George III., and the Duke of Bedford, at the wish of Mr. Ellman, put a price upon them, as he liberally observed he did not wish to charge a foreign sovereign who had done him so much honour more than any other individual. The price agreed upon for the two was three hundred guineas, and the Duke of Bedford took two for himself at the same rate, expressing content with his bargain; such was the reputation of Mr. Ellman's breed in 1798, about which time this occurred.

In December, 1798, the Smithfield Cattle Show was instituted by Francis, Duke of Bedford, Mr. Ellman, and Mr. Astley. This last gentleman was the father of the Smithfield Club for several years before Mr. Ellman attained by survivorship that melancholy dignity; he was an eminent Leicestershire breeder, though, we may conclude, of a less calculating selfish policy than most of his fellows in that county,

* Annals XXXI., where, in two letters to Arthur Young, Mr. Ellman says he set on foot the sweepstakes at the Lewes Show. He did not show any of his own sheep, but had them taken to another field that they might not detract from the appearance of the others.

for it was of him the Duke of Bedford once good-humouredly remarked, that Astley would ride a hundred miles and spend £20 to sell a ram for £10. The Smithfield Club was originally formed on nearly the same plan as the one at Lewes, but from its metropolitan character it has, in a great measure, continued free from those local prejudices which Mr. Ellman always dreaded, and which have proved so detrimental to provincial associations, however well organized.

We must now narrate Mr. Ellman's course of proceedings in an undertaking which at first glance may seem somewhat foreign to his customary pursuits, but in the prosecution of which we shall discern his habitual energy—we allude to the improvement of the Ouse navigation and the drainage of the adjacent levels. The Ouse is a rapid tide river, flowing through the town of Lewes, and emptying itself into the channel at Newhaven; and adjoining its banks, in this part of its course, are upwards of 4000 acres of levels, which were formerly of little account, while the navigation of the river itself for commercial purposes was uncertain and full of impediments. Prior to an Act passed in the year 1791, to which we shall presently advert, the river Ouse was under the sole management of the Commissioners of Sewers, and its state may be gathered from a survey of that eminent engineer, the late John Smeaton, who reported in 1767, that the tides were scarcely perceptible at Lewes Bridge, distant only eight miles and three-quarters from the sea; and in 1789 Mr. Ellman, who had been appointed Expenditor of the Lewes and Laughton levels, under the Commissioners of Sewers, in 1782, found, on making a careful survey, that the levels were in as bad a state as the navigation. We are enabled, on the most accurate authority, to add, that for several years subsequently to 1789 the levels were under water eight months out of twelve; and during the summer, after moderate rains, the cattle were frequently obliged to be driven out of them for many days together, and the lowest brooks, as the levels are here provincially called—(for the convenience of local readers we specify Ranscomb, on the east side of the river, which formerly, in the month of June, were three feet under water, and, being for the greatest portion only a bog of bulrushes, let for a trifling annual sum to chair-bottom makers)—are now in a state of high cultivation, and cattle are grazing in them through the entire year.

From the time that Mr. Ellman made his first survey of the river and levels in 1789 up to the completion of the works under the last Act of Parliament, 31 George III, which he exerted himself strenuously to obtain, he devoted a large share of his valuable time to the promotion of this public improvement. Barges were often a week, and during land-floods two and three weeks, in coming up the river from Newhaven to Lewes, and now they easily and regularly make their passage in a single tide; in fact, it is very common for a barge to be laid alongside a ship in Newhaven harbour, after all the loaded barges at the flood-tide have got under weigh, to take in from twenty to twenty-five chaldrons of coals, and arrive at Lewes by the time of high water.

And in a national point of view these improvements, suggested by Mr. Ellman's foresight, and urged forward to completion by his perseverance, are worthy of distinguished praise; for Newhaven harbour, really the only place of convenient shelter between the Downs and Spithead, has been thereby substantially amended. Before the river Ouse was opened and the shallows taken up, vessels drawing only nine feet water were frequently obliged to discharge half their cargo before they could be got into the harbour; whereas now, at the very lowest neap tides, ships drawing fourteen feet water easily come in.

Mr. Ellman's first connection with these matters commenced in 1780, when he was returned by the sheriff and sworn on the jury at the Water Court for the Lewes and Laughton Levels. In 1782, as we have already noticed, he was appointed under the Commissioners Expenditor of these works, and from that time up to the passing of the Act in 1791, whereby the present Commissioners were appointed and furnished with authority and powers concurrent with the Commissioners of Sewers, and which Act Mr. Ellman was mainly instrumental in procuring, he employed himself with unflinching perseverance in making those surveys and estimates which shewed the public the importance of the projected changes and their manifold advantages.

In 1791 he was chosen on the Committee to manage, direct, and carry on the works, and elected Treasurer to the Trustees of the Ouse lower navigation; but finding a proper application to the needful arrangements for carrying the new works into full effect incompatible with his other numerous avocations, he resigned the office of Treasurer in 1794. He was chosen a Commissioner of Newhaven Harbour in 1822, and took an active part in every measure relative to its improvement until his death. In 1822, the trustees of the river appear to have become more sensible to the vast importance of the works intrusted to their control, but found great difficulty in meeting with a superintendent who could, with competent abilities for the task, devote sufficient time for furthering the undertaking, when, on Mr. Ellman's express recommendation, they chose his ward and relation Mr. John Ellman, now of Landport Cottage, near Lewes, who, in 1792 and 1793, had accompanied him in arranging the plans for completing the contemplated works, and had for many years enjoyed the entire confidence of his revered relative. From that period to the present hour this gentleman has devoted himself to carrying these improvements into effect with an industry that no labours have tired, with a skill that has elicited the approbation of Mr. Cubit, Mr. Telford, and every engineer who has had opportunity of observing the effect of his care and diligence, and with a zeal which no opposition has daunted. It is superfluous to suggest that the progress of every public work is occasionally thwarted and retarded by private prejudices and party views: from this general fate the Lewes navigation has not been exempt, but those who have patiently persevered through evil report and good report may now reap the reward of their energy in seeing pastures ever verdant and covered with cattle, which a few years ago were not available four clear months

in the year; they may trace too the ruddy glow of health in faces which, before the ameliorating influence of a clear drainage, were sickly from agues and intermittent fever; and they may contemplate, after one more shallow, of no great extent, is removed, the feasibility of making Lewes a seaport with ships of a hundred tons and more unlading at its quays, and the near probability and present possibility of Newhaven being a harbour for his Majesty's navy, and a ready rendezvous for wind-bound Channel fleets.

The sense entertained of Mr. Ellman's merit was publicly manifested in 1800, by the presentation of a silver cup from twenty-seven of the nobility and principal landowners of the county of Sussex, bearing on one side a pleasing portrait of a two-year old ram which gained the prize at Lewes, in August, 1798; and on the other the names of the donors, and the following inscription:—"The undersigned, truly grateful for the great advantages rendered to the sheep-breeders on the South Downs, by the exertions and assiduity of Mr. John Ellman, of Glynde, in making the merits of this valuable breed of sheep generally known and demanded, offer him this cup as a token of their esteem."

On this occasion Mr. Ellman was honoured with a letter of congratulation from Lord Egremont, which is far too valuable a testimony to departed worth to be withheld from these pages.

"SIR, *Petworth, Feb.* 15, 1801.

"I assure you it gave me the greatest pleasure to find that your merit has received a much more solid and flattering testimony than any compliment from noblemen and gentlemen, who at best know but little of the matter, could be, in what I understand to be the spontaneous tribute of the farmers, your neighbours, who certainly are best qualified to appreciate your merits in the farming line. But I am far from confining your merits to that line only, and I may, perhaps, be as good a judge as they are of your numerous good and valuable qualities in many other ways, for which and for your character in general I certainly feel the most sincere regard and esteem.

I remain, Sir, your most obedient humble servant,

"EGREMONT."

The noble lord must pardon us for saying, in spite of his own modest disavowal, that few better judges than himself can be found on rural as well as most other useful subjects; and we regard his approbation as no light test of Mr. Ellman's sterling merits, whom, in another letter about this period, he thus addresses: "I consider you as the fountain of all the improvement which has already and will take place in the stock of the whole county of Sussex."

Mr. Ellman had now attained the highest reputation, and there were placed within his grasp more of the elements that constitute human happiness than are commonly allotted to man. The conscious possession of power and moral worth supports men under the most trying privations, nerves them for the performance of the most laborious works, strengthens them to endure the sharp stings of disappointment and

disaster, and bears them triumphantly over difficulties, which to feebler natures would present an unconquerable bar; but through such trials, common in the course of life, but severe, Mr. Ellman was not called to pass. Free from the distasteful drudgery of professional practice or the carking cares of political life, pursuing an honourable and healthful occupation, which is often sought as a refreshment after the dangers of war and the exhausting toils of the cabinet; content with the soothing society of a wife, whose pleasure consisted in the performance of his wishes; respected by his neighbours, and honoured by the high-born and noble; easy in pecuniary circumstances, and though too generous to accumulate, never wasteful; devoting the profit of his labours to the maintenance of a liberal hospitality and the relief of the poor—blessing and blessed,—we can hardly conceive amidst the chequered scenes of human existence a more enviable position. We have elsewhere remarked, that no man was more free from any thing like ostentatious boastfulness than Mr. Ellman, and his sound good sense was eminently displayed by the unaltered simplicity of his manners in society brilliant enough to have dazzled one more used to splendour and flattery than a Sussex farmer. We doubt whether he would have readily permitted us to publish the following anecdote, but now there is no reason for its suppression; for all, alas! are dead, and therefore we give it as narrated to us by himself not many weeks before his death, when we little contemplated being called upon so soon, if indeed ever, to the melancholy though not ungrateful task of commemorating his life. In those days of social festivity, when the Prince of Wales assembled around him, at his Pavilion, Fox, Sheridan, and others, than whom choicer companions never "set the table on a roar," who knew how to scatter the flowers of wit over the pleasures of the banquet, where wealth and genius lent a blended grace to revelry, the late Duke of Bedford, then in the spring-time of youth, used to leave that gay and gorgeous palace, and, riding over the Downs with a single, and often without any attendant, would take up his abode with Mr. Ellman, and devote himself to the study of agriculture, and his improvement in those arts which he rightly considered of such national importance. On one of these visits, after many days' absence from Brighton, he accompanied Mr. Ellman in his unpretending gig to the Lewes race-course, where the Prince and his merry companions soon surrounded the Duke, to learn where he had been hiding himself—"Please your Royal Highness, I have been farming with my friend Ellman," was his candid reply. The young nobleman, who was thus willing to forsake the fascinating bowers of pleasure, in her most alluring form, for the cultivation of his mind and its preparation for patriotic purposes, well deserved the eulogy which Fox pronounced upon him on his premature death in 1802. Words of more touching eloquence were never breathed from the lips of that master orator—it was a Roman funeral oration—it was Cicero lamenting Cincinnatus.* Again and again have

* See Hansard's or Cobbett's Parliamentary Debates for that year. The speech was made by Mr. Fox on moving for a new writ for Tavistock.

we heard Mr. Ellman dwelling with evident delight on the liberality and thoughtfulness which characterised the late Duke of Bedford, whose arrival at Glynde was not dreaded as that of a fastidious peer, who could not be satisfied with less accommodation than a palace could supply, but was welcomed with unruffled pleasure by every inmate in the house, whose plain but ready services were perfectly satisfactory to the lord of Woburn Abbey. We think it not too trivial to mention that His Grace was contented to be waited on at table by servant maids, whose place we wish had never been usurped in farm houses by liveried lacqueys. Since farming men have been driven from their master's house to lodge in village barracks, and maids have no longer waited in the parlour, the prosperity of the farmer has declined, and so it will continue to do until those good old customs are revived—but more of this presently. One extract from a letter of this estimable Duke's to Mr. Ellman, and we will proceed in our narrative. "Mr. Coke and myself ought to make it our primary object to promote every improvement in the management of farms at the least expense to the cultivator, otherwise we have no business to be farmers; you have a fair right and ought to look for a full remuneration for all the trouble and expense you have been at in the improvement of the breed of sheep in question."

In the same year that witnessed his brother's lamented death, the present Duke of Bedford thus addresses Mr. Ellman: "I am happy to learn that the opinion you entertain of the South Down flock at Woburn is so very favourable; and, I trust that, by a constant and steady attention to their improvement, they will at least not degenerate in my hands. My late brother, whose memory, as you justly observe, must always live in the hearts of those who knew him, ever considered himself indebted to your judgment and assistance in the selection and management of this flock, and I have now to return you my best thanks for the trouble you have taken." Perhaps no man felt with more poignant anguish than Mr. Ellman the premature death of this estimable nobleman, who, in the language of Mr. Fox, "did not live for the pleasure but for the utility of life;" and while we are upon this subject we will refer to what took place at the Sussex Agricultural Meeting, held in the August following the Duke's decease, as illustrative of the sense all but universally entertained of his merits. On this occasion upwards of two hundred gentlemen dined at the White Hart, in Lewes, and among the company were Monsieur Parmontier and Monsieur Houchard, members of the French National Institute, on proposing whose health the noble chairman, Lord Egremont, observed: "These gentlemen, after a ten years' war, had visited this country expressly for the purpose of being present at the exhibition this year, and thus to enable themselves to judge and explain to their own country what had been done here to advance the true interest and happiness of mankind." The French gentlemen expressed their thanks in appropriate and polite terms, and gave, after the English fashion, as a toast—"Prosperity and success to Agriculture all over the world." But, alas! these

peaceful sounds were quickly lost in the roar of renewed hostilities. After the peace, Mr. Ellman was invited to become a member of an agricultural association at Rouen, established so long ago as the year 1761, and restored after the tempest of revolutions and wars, in 1819, under the title of the Société d'Agriculture de la Seine Inferieure. Mr. Thomas Ellman, of Beddingham, one of Mr. Ellman's sons, had the honour of receiving a silver medal from this society on a visit to Rouen, presented to him as a tribute of honour and respect to his father. In saying this we are not seeking to detract from Mr. Thomas Ellman's personal merit as a breeder, who, at the Smithfield Show, in 1833, gained the gold medal for a South Down sheep, against all England; on which occasion the whole meeting acknowledged his sheep were the best ever exhibited. Mr. Ellman corresponded with the French association several years, and some of his communications were published by the Société d'Amelioration des Laines, at Paris; we regret that our confined limits preclude the present possibility of submitting a specimen of them to our readers. But to resume—Lord Egremont then gave the memory of the late Duke of Bedford; a sentiment which, according to the expression of one present at the meeting, seemed to operate forcibly on the feelings of all present. His Lordship began to explain the intention of the late Duke's friends to erect a monument to his memory, but so much was he affected that, for a few moments, he was unable to proceed; recovering himself, he, in a manly, energetic address, stated the motives which had actuated the late Duke in his general conduct, who, he said, had devoted the whole of his matchless talents and ample fortune to the diffusion of knowledge, the benefit of society, and the godlike virtue of doing good.

In December of the same year, at the Smithfield meeting, Mr. Ellman desired to relinquish the prize adjudged to him for one-year-old short woolled wethers, in favour of the Duke of Bedford's bailiff, Mr. French, as the Duke was precluded from having that prize merely from the words of an advertisement, which Mr. Ellman conceived to be erroneous—an instance of liberality and candour by no means exhibited on a single occasion; for again and again did this generous man act in a similar manner. In 1816, at the Sussex cattle-show, a piece of plate was awarded to Mr. Ellman for the best three-years' old bull, which he declined in favour of the owner of the next best of the same age, and calling upon the judges to name such owner, they decided in favour of Mr. Knight, of Offham, who was requested by Mr. Ellman to accept the same. He exhibited no description of stock for prizes after 1816; and for many years previously, we have already remarked that he withdrew from competition near home with the breeders of his own county, that he might encourage them to perseverance, so absolutely through his long life did he subject private considerations and the spirit of personal rivalry—so hard to expel from the breast of those enthusiastically devoted to any particular pursuit—to a governing sense of public duty. To no man perhaps were more opportunities offered for promoting his private advantage than to Mr. Ellman, and by none were they more in-

variably postponed to higher and more noble motives. "I am quite uneasy," writes the Earl of Albemarle to him in 1802, "at giving you so much trouble, and pray do not be offended if I acknowledge I am entirely at a loss to know what kind of a return to make you. You would oblige me much by giving me a hint upon this subject."

No such hint was ever given beyond the expression of a grateful sense of his Lordship's kindness. For many years Mr. Ellman maintained an intimate intercourse with the late Lord Somerville, who ought to be had in honour in the memory of his countrymen, for introducing the Merino breed of sheep from Lisbon, and whose exertions to promote the improvement of wool only terminated with his departure from this life in 1819. He was a Lord of the King's bed-chamber, and by his favour Mr. Ellman was in 1719 introduced to his Majesty, George III., who graciously held a long conversation with him at Kew on agricultural subjects, and presented him with half-a-score Merino ewes, and two rams of the same breed, then recently imported into England, and cherished by our patriotic Sovereign with no common care. Lord Somerville proposed this introduction to Mr. Ellman, in the kind and even playful manner that distinguishes all that warm-hearted nobleman's communications, and which sheds an indescribable charm over his letters, from which we can only give a few extracts, though their unreserved publication would do honour to both writer and receiver: the display they unfold of ardent devotion to the advancement of public improvements might reconcile a democrat to aristocracy, and their smiling good humour might put the morose into better temper with human nature itself. Mr. Ellman was thus familiarly invited to the royal presence—" Would it suit you to be up by Thursday, which is the day the King looks at his farm at Kew. I wish to make you known to him, and for this plain reason, that our trade has not many of your complexion to boast of."

A corrupting disregard of moral merit on the part of parish officers (deplored by Mr. Ellman in 1795, and noticed under an aggravated form by the present Commissioners,) has certainly been a main ingredient in the progress of rural corruption; but we must not overlook the extraordinary circumstances through which the country has passed since the date referred to up to the present hour, nor the effect they have had in augmenting our pauper population, while they have diminished our means of relieving them. The high prices of the war tempted farmers to many expensive luxuries, and among them to a practice which we shall never cease to lament, and the baneful effects of which we fear we have not yet seen in their full extent—the removal of the unmarried labourer from his master's roof. This was the first dissolution of the bond that had hitherto united the farmer and his man in amicable intercourse: hence followed early and improvident marriages, a suddenly increased population beyond the ordinary demand for labourers; then came poverty, discontent, and disorder, too shortly to ripen into the revengeful spirit horribly revealed in the midnight fire.

For many years, indeed up to his retirement from business, Mr. Ellman kept a number of labouring servants in his house, and paid so careful an attention to their improvement in their respective employments, that his service was considered as an agricultural school, and many men are now living in respectable independence, and some are conducting extensive enterprises and enjoying affluence, who were once inmates of Mr. Ellman's house as farming servants, who all willingly attribute their rise in life to the lessons they received at Glynde. Mr. Ellman's sober good sense prevented his indulging any thing like those freaks of charity, which have been recorded of some eccentric individuals, such as hiring a highwayman for a household servant, actually the feat of a certain religious humourist not long since deceased. But on one occasion, Mr. Ellman, in reliance on his discernment of character, gratified his benevolence in what must ever be at best a dangerous experiment. A young man presented himself at the door to beg: Mr. Ellman, pleased with his manner and appearance, asked him if he would work, and on his eagerly expressing his wish to do so, could he find regular employment, instantly divested him of his rags, and took him into his house; while he continued at Glynde he was active, laborious, and obliging, and not many years ago this lucky mendicant died possessed of a comfortable competence, at Brighton, where he had been apprenticed, after some length of service with Mr. Ellman, and had lived respected. Kind-hearted, however, as Mr. Ellman was to all those in want, and generous in rewarding merit, and encouraging the industrious, no man was more clear-sighted in detecting delinquency, and few more severe in punishing what was done amiss—a rod for the fool's back was a maxim acted up to at Glynde, with as exemplary rigour as Solomon himself, the royal foe of fools, could have desired. The village of Glynde was, during the whole of Mr. Ellman's residence there, a model of good management;* he allowed no public-house there, but more kindly took care that the labourer and his family should have their wholesome beer at home. Had every farmer acted in his household and towards his labourers as Mr. Ellman did, we do not say that the transition from war to peace, from high prices to low, from an ample to a limited demand for labour, would have induced no confusion; nor that the change of the currency, and the unfettering of commercial intercourse would have wrought no bewilderment and ruin; but we insist that the evils would have been mitigated, for they would have fallen upon a comparatively moral race, upon servants daily sensible of a master's care, and therefore prepared to sympathize and suffer with him on a reverse of fortune; upon labourers who, after spending their early years under their master's roof, had married in mature manhood female domestics who had also attained competent skill and discretion for the management of a family, and not the drabs of a poor-house or the sluts of a scullery; upon farmers of firmer

* I know that you have attended to these subjects for many years, and I believe there are few better regulated or happier villages than Glynde."—*Lord Chichester to Mr. Ellman in* 1822.

texture than those whom expensive pleasures had unnerved for the day of trial; and lastly, upon landlords, who, having witnessed their tenants' uniform correct conduct and abstinence from pursuits unbefitting their station, would, we firmly believe, in most instances, have submitted to retrenchment and personal privation rather than that those who had held them so long and so respectably should be driven from their farms.

As Mr. Ellman's views were benevolent, so were his proposals always practical: keep your young unmarried labourers in your own house; let them feel the comforts of a good home and plentiful table, and they will be careful of risking these by improvident marriages; let your wives and daughters superintend personally the female servants, and they too, acquiring a taste for a cleanly and well-funished establishment, will not tempt the youths to hasty wedlock, nor, indeed, consent to enter into it with a partner without some little money or ability to earn it. When your farming men marry, and settle in a cottage, let them have grass land for a cow and pig, and arable enough to grow potatoes and vegetables for their family, and above all pay them according to their skill, teach them to respect themselves, and they will respect their employer, and protect his property. Give your labourers the means of brewing good beer at home, and most of them will seek no ale-house; and remove all temptation from those who would, by allowing as few beer-shops and pot-houses as is compatible with the convenience of travellers. When you have done all these things, we have often heard him say, if they fail, you may coerce by punitive legislation: but before you have tried these moral measures, your laws will, in most cases be evaded; and, where they are executed will awaken, perchance, a sympathy with the sufferer as one for whose reformation and restraint no efforts have been made, as one who, neglected, corrupted, and debased, is punished for the vices engendered by destitution.

In 1805 the Duke of Bedford presented Mr. Ellman with an elegant and valuable silver vase, with the following inscription:—

"To Mr. John Ellman, of Glynde, in the county of Sussex—As a testimony of his meritorious and successful exertions in the improvement of a breed of sheep possessing properties truly valuable to the interests of British husbandry and commerce, and as an acknowledgment of his liberal assistance to individual efforts in pursuit of the same object—This cup was presented by John Duke of Bedford, 1805."

As illustrative of the high estimation in which Mr. Ellman's opinion was held, we give the following extract from a letter of Lord Bridgewater in 1814: "We have, as you may have seen in the paper, gone into a Committee in the Lords upon the growth, consumption, cultivation, &c. of grain. One of our inquiries will be the present state of the agriculture of the country, and its capacity to produce an increased supply by a more liberal application of capital, and by improvements in the manner of cultivation. If you should not object to be examined,

I am certain few persons, if any, could give us better information. I have just shown what I have written to Lord Hardwicke, our chairman, who thinks that if you are so good as to come, the sooner you can come the better, without waiting for any regular summons."

In the year 1821, Mr. Ellman was examined before a Committee of the House of Commons, to whom the petitions complaining of the depressed state of agriculture had been referred. We had intended giving a synopsis of the interesting and useful matter contained in the Report of this Committee, and the evidence laid before it, but must now confine our extracts to a few passages from Mr. Ellman's evidence illustrative of his character, and the views he entertained on some of the subjects to which we have adverted.

"As far as you have observed, have the farmers increased or diminished the quantity of labour on their farms?—The farmers, generally, have decreased the quantity of labour.

"What are the wages you now pay?—Knowing, in some parishes, that the increase of the poor's-rate may be caused by the low price paid for labour, I took out the account for the same period of the prices I pay to the different labourers, and the Committee will see, that in the parish of Glynde, the price of labour has not diminished at all, but has increased during that period; it has not increased within the last five years, but the rate of wages generally in the county has decreased within that time.

"From your observation among the working classes, is their situation better or worse from the reduction in the price of provisions?*—I consider the labourers employed in agriculture to be considerably worse off than they were five or ten years ago.

"Had the tax on malt any operation in lessening the consumption of beer by the labouring classes?—I am confident it has in our parish.

"When you first began business, were your labourers in the daily habit of drinking beer?—Yes; all of them.

"Has that practice ceased altogether, or does it prevail now in part?—It has ceased generally where the masters do not find them in beer; when I first began farming in the parish where I now reside, we had not a family in the parish that did not brew their own beer and enjoy it by their own fireside; there are few of them now that do, unless I give them the malt.

"Do you believe that the best quality of land in the kingdom would be able to compete with foreign grain if it could come freely to market?—There is one way in which I think it could; that is, for the

* "The usual breakfast of a labourer in this part of the world (Glynde, Sussex) is broth made of coarse ends of beef, with oatmeal, flour, and butter; or boiled milk and bread and cheese. His dinner, is sometimes pork and bacon. His supper, bread and milk and cheese; new milk half a pint. Good fare, adds Arthur Young, to the above account written in 1791." Annals of Agricultre, vol. XXII. p. 219.—Would that the labourer thus fared in 1834—we should have no rick-burning then—and be spared the arguments of sucking Beccarias in favour of incendiaries, highwaymen, and burglars.

farmers of this country to be relieved from taxation and tithe, and then I think we could compete very fairly with the foreigners.

"Do you mean that if all taxes, all poor's-rates, and tithes were taken off, we might compete?—Yes; I should have no hesitation in saying we could then compte with them on equal terms.

"Do you think there is a possibility while these remain of the best grounds being cultivated with a view of meeting the foreign farmer?—I think it impossible that it could be.

"Explain what you mean by taxes?—Taxes which fall upon the farmer; the malt-tax is a very oppressive tax on the farmer; all other government taxes; I do not speak of the assessed taxes only, but on every article the farmer consumes. When I speak of taxes, I include the leather tax as one that is a considerable tax on the farmer, for the leather he uses with his draught-horses, and with regard to his labourers, which is a tax that bears on the farmer, though paid in the first instance by the labourer.

"How do you account for the rise in the rent since 1790, of the farm which you hire, while the rents of the farms for which you are agent are the same or lower than they were in 1790?—I answer, that I can ask more for another than I can do for myself; that is the only reason. I have not so large an abatement as is made to other tenants on the estate for which I am concerned."

In this last answer the reader may trace Mr. Ellman's genuine character; he was ever ready to postpone his own interest to that of others; he could indeed ask for them what he never solicited for himself. We have not space for comment on the foregoing extracts, which, in fact, are too explicit to need much; we have already dwelt at some length on the injurious effects of the malt-tax, and Mr. Ellman's opinion of it; we cannot, however, suppress the expression of a wish that farmers in general had been possessed of a portion of his fortitude and foresight, and acted according to his example in employing labourers at any inconvenience or risk, rather than keeping them on poor-rates. Many a farmer has connived at or even encouraged the setting up of a beer-shop in his village to save his cellar, who would have acted with better economy in brewing gratuitously for half the parish. The boldness too with which he urged the inability of the English farmer to compete with foreign growers while such an amount of tithe presses upon his capital, and so many taxes are exclusively laid upon him, is worthy of all admiration. Relief for themselves, and not the oppression of other classes of the community, should be the aim of agriculturists; and certainly all high protecting duties under an altered currency and relaxed commercial restrictions tend but to increase that ill-founded but widely-spread popular dislike which the demagogues of towns, for their own selfish purposes, so sedulously foment. A general commutation for tithes in kind was long a cherished measure for agricultural relief with Mr. Ellman, who always insisted that tithes, as at present collected, operated as a discouragement to agricultural industry and enterprise—he pronounced them a

tax on skill and care, and a bounty on sloth. He was not one to withhold their dues from the clergy of the Established Church, of which he was himself an exemplary member; on the contrary, he contended that, while the farmer's capital was cramped by the tithe system, and feelings of animosity fostered in the bosoms of his parishioners towards their pastor, he, on his part was often defrauded of his right, though he never gained credit for any concession he might make. And not only on tithes, but on every subject connected with the interests of agriculture, Mr. Ellman's active mind was exercised. In 1797 Mr. Ellman received the thanks of the Board of Agriculture, through their Vice-President, Lord Winchelsea, for a communication on an improvement in flails. In Sussex, where shaws and belts of wood are prevalent in many parts, in almost every field, the property in trees is often a litigated question between adjoining proprietors; Mr. Ellman always expressed an anxiety to have this matter put at rest by some well-defined and general rules. We recollect holding many conversations with him on the point, and mention it as illustrative of the vigilance of a mind which no object escaped. He was for many years a Commissioner of taxes, and often have the Crown lawyers yielded to his views. In days of heavy taxation, levied not seldom by oppressive and intermeddling officers, a firm Commissioner to whom appeals may be preferred, is of inestimable advantage to a neighbourhood.

In 1828, the publisher of the Library of Agricultural and Horticultural Knowledge solicited the assistance of Mr. Ellman in the completion of his design, which was instantly afforded with that generous communicativeness by which he was so pre-eminently distinguished. The article on Sheep, which has been pronounced by a competent judge worth ten times the sum charged for the whole book, was entirely written by Mr. Ellman, who also contributed valuable observations on neat cattle, rotation of crops, and patiently overlooked and corrected two-thirds of the whole volume. We are only uttering a sentiment shared in common with the publisher, in breathing our humble wish that it had been graciously conceded to us to announce Mr. Ellman's further contributions to the last edition presented to the public, instead of prefixing this slight and unavailing tribute to his memory.

We have elsewhere observed that Mr. Ellman's facility in recording the results of his experience afforded grounds for congratulating posterity, who might otherwise have lost these useful fruits. He was no scribbler, but wrote easily and perspicuously from a full mind, and never, except when he had some immediately practical object in view, —for practice was the school in which he learned his lessons. He was, however, a practical man, far different from those who fancy they establish their character as working farmers, by incessantly ridiculing systems, and avowing their contempt for books which they are too indolent to peruse. Not so Mr. Ellman, who, to the close of his life, thirsted for information, and gathered it from every quarter; in the labours of the field, and in conversation with the shepherd and the hus-

bandman, to whose rude but ready remarks he always listened with the deference due to direct observers of Nature's phenomena. But he did not absurdly reject those observations the moment they were recorded in a book, and foolishly fancy that facts reduced to writing must, by virtue of ink and types, be transmuted into idle speculations. We perhaps waste time in labouring such a point, but there exists much misapprehension on this head among farmers, not a few of whom we have heard strangely perverting Mr. Ellman's avowed preference of practice to theory. He might occasionally chide youths who were pretending to read, that they might escape handling the hoe on a rainy morning; but he always eagerly read books himself, and encouraged it in others. For many years he maintained at his own expense a school in Glynde, for the instruction of the villagers, and often have we heard him praise a shepherd in his service who was accustomed to carry a book with him out on the Downs to read while tending his flock; and actually engaged this man as a schoolmaster, to teach the men and maid servants in his house to read and write. The honest and intelligent fellow married a dairy maid whom he had himself instructed, and is yet living. His name is Charles Payne; and at Lord Somerville's spring show, in 1808, he gained the first shepherd's prize for having raised 799 lambs from 600 ewes, and only lost 21. Let it not be forgotten that this encouragement of reading and writing occurred before these accomplishments were general, and when Mr. Ellman's winter evening school in his kitchen by no means met with approbation in the neighbourhood.

Mr. Ellman contributed many instructive articles to the Farmer's Journal, and also to the Transactions of the Board of Agriculture. That society, before they finally published the Surveys of different counties, undertaken under their direction, sent a printed copy, with ample margin for additions and corrections, to the most intelligent persons in their several districts. The survey of Sussex was thus submitted to Mr. Ellman for his revision by its author, the Rev. Arthur Young, who, as well as his estimable parent, largely profited by his local knowledge of his native county, and freely imparted information. We have already quoted some of Mr. Ellman's contributions to the Annals of Agriculture, where many valuable communications will be found on referring to that useful work.

In 1829, Mr. Ellman determined upon retiring from active life, though his mental powers were vigorous as in early manhood, and his bodily health justified the expectations of his friends that he would yet pass many years in the enjoyment of tranquil and richly merited ease.

His flock was sold by auction, and we subjoin from the catalogue a list of prices, which we need not say would have been much higher had the sale taken place some few years ago. Mr. Ellman's friends were desirous of presenting him, previous to his retirement, with some public token of their esteem for his character and conduct, and to effectuate this object several meetings were held at Lewes: we tran-

scribe two of Lord Egremont's letters on these occasions. Our readers will not forget the congratulatory one addressed by his Lordship to Mr. Ellman, in 1800,—thirty years had nearly rolled away, when, in 1829, this venerable nobleman thus expressed again his esteem for Mr. Ellman; such a proof of undiminished regard on the part of one so competent to judge of merit, and who had such constant opportunities of witnessing deficiencies, if any existed, cannot but be highly acceptable to all those to whom Mr. Ellman's name and fame are dear.

"Sir, *Petworth, May* 16, 1829.

"There is no man living who is more desirous of showing every possible mark of esteem, friendship, and gratitude to Mr. Ellman, than myself, nor more convinced of its propriety and justice; and I should very much wish to assist at the presentation of the piece of plate, but my health and strength have become so uncertain, that I cannot depend upon being able to take a journey, or to undergo any exertion at any fixed time, which may be productive of much inconvenience. At all events I will endeavour to be present, and I shall be obliged to you, if you will let me know as soon as you can, the time when you think it will be most convenient and agreeable to the Subscribers to have their meeting.

I am, Sir,
"Your most obedient humble Servant,
"To Mr. Putland. "Egremont."

"Sir, "*Grosvenor Place, July* 10, 1829.

"I am afraid that I cannot flatter myself with any hope of being able to attend at Lewes on the 27th, as I am now confined in London with a painful illness. I am extremely sorry that I cannot personally co-operate in the expressions of public gratitude and esteem, which are so justly due to the services and character of Mr. Ellman.

"I am, Sir,
"Your obedient humble Servant,
"To Mr. Putland. "Egremont."

The Duke of Richmond was prevented by Parliamentary duties from a personal attendance at the meeting, but Sir John Shelley read a letter from his Grace, couched in similar terms of respect and admiration.

A massive and tastefully ornamented silver tureen, surmounted with the figure of a South Down sheep, and bearing the names of the hundred and eighty-six noblemen and gentlemen, the donors, was presented to Mr. Ellman in the month of August, and many individuals have regretted that their own names did not swell the list; but regard for Mr. Ellman's delicacy had induced the projectors of the intended compliment to carry on their first steps with celerity and secrecy.

Some years previously to this date, Mr. Ellman once applied to the eccentric but excellent John Fuller, for a subscription to present a

piece of plate to a noble lord. Mr. Fuller's answer was, that he thought Mr. Ellman better deserved a tribute than his Lordship; but to show that no parsimonious motive dictated his refusal, begged Mr. Ellman's acceptance of a silver salver for himself. The noble person whom Mr. Ellman was seeking to honour well merited any token of respect that could be offered him, but we cannot find it in our heart to condemn honest John Fuller, as he will long be called in Sussex, for his preference of Mr. Ellman.

The tureen bears the following inscription:—

To
JOHN ELLMAN, OF GLYNDE, ESQ.,
on his retiring from the Farm,
in which, for more than half a century, he had devoted himself
TO THE INTERESTS OF AGRICULTURE,
As a Token of their sincere regard, and a Tribute to his great merit,
especially in improving and extending throughout
THE BRITISH EMPIRE
THE BREED OF SOUTH DOWN SHEEP,
and his much admired conduct
TO HIS LABOURERS,
This Piece of Plate is presented,
By a number of Agriculturists and Friends;
And to his Family,
A Portrait of Himself.

This "portrait of himself" was the only unpleasant part of the business to Mr. Ellman, who was so irritated and annoyed by his sessions for the purpose that he became quite ill. We can well sympathise with the sufferings of our worthy friend; for the abolished punishment of the pillory, banishing its unsavoury accompaniments, would be little more irksome to us than sitting for a likeness. An engraving from the original picture, by Lonsdale, is prefixed to *Baxter's Library of Agricultural Knowledge*, and a faithful likeness it presents, though an air of severity is visible, such as seldom settled on Mr. Ellman's handsome features and noble countenance. When young, he had a singularly fine and symmetrical person, and indeed his figure never stooped to the last.

From the year of his retirement from business to his death Mr. Ellman resided alternately at Lewes and High Cross, a small estate of his own near Uckfield. The blessings of the poor, for whose welfare he had so long laboured, followed him in his retreat from active life, and innumerable instances of their affectionate regard amply rebut the charge of ingratitude so flippantly brought against the labourer by those who know him not. To the latest period of his life the servants who had worked on his farm regarded him as their friend; and when separated far from him, and engaged in distant employments, would, after an interval of years, visit his residence, where they were always sure of a ready welcome.

The following character of Mr. Ellman was drawn by one whom he had befriended, and he shall tell his simple story in his own unadorned language :—" Mr. Ellman was liberal on every occasion, very friendly to myself and others in pecuniary affairs, and though we sunk the money he befriended us with, he never upbraided us with the loss of it, but continued his friendly offices to us ever after as though nothing unpleasant had occurred. It was customary for Mr. Ellman to give away at Christmas the beef of two or three little beasts to such persons in the parish or neighbourhood as choose to accept it, was always a steady friend to the industrious poor, and have often heard him say, nothing gave him more satisfaction than to see people do well. Mr. Ellman once thought that one of his harvesters had drawn a guinea too much; he sent for the man from Mayfield, on investigation it appeared it was Mr. Ellman or the bailiff that had made the mistake. He then gave the man plenty to eat and drink, and a guinea for his trouble in coming up. Have heard George Brookes, Esq., say, he admired Mr. Ellman particularly for the goodness of his heart."

This is valuable testimony, and will be appreciated by all who are not above listening to " the short and simple annals of the poor." Our readers, we think, will relish the following extracts from another correspondent as furnishing faithful traits of character :—

" But few men ever secured the sincere affections of the peasantry more effectually than did this gentleman, nor did he accomplish this by means offensive to general society. He was a strong disciplinarian; he took especial pains that all under him did their duty. He watched the moral conduct of the poor, and gave every discouragement to vice; while he gave strong inducement to virtue. He rewarded industry and punished idleness. It was a maxim with him that one man of flagitious habits would corrupt a whole parish; for often has he said, ' Men are governed by example; most men are more prone to evil than good, and if one man is bad, another, when he commits a fault, will immediately, when he is reprimanded, excuse himself by saying, I am not worse than so and so.' This golden rule led him to watch carefully the moral state of the peasantry. When he saw a man diverging from the path of virtue or neglecting his duties, he was particularly severe to that individual, nor would he consider he had performed his own duty until he had reclaimed the man. These practises long pursued in the parish of Glynde gave the place a most delightful appearance. The men were industrious, the women cleanly, and the children happy. The cottages were well regulated and healthy, the gardens well cultivated, and the roads in the best possible state. The poorer classes looked to Mr. Ellman as their guardian; when in trouble they consulted with him, and his advice was readily given; he pointed out means for surmounting the difficulties, and when his own private purse was wanted it was open to their necessities. He was distinguished for his charity, which was helped out with a judicious hand. He would not allow any public-house in the parish, nor any other place where men could congregate, or have inducements to neglect their families. ' Lead us not

into temptation' ruled his actions throughout. By severity to the wicked and inducements to the honest and industrious he gained the praises of all below him—nay, even secured their affections. We saw a striking proof of this after Mr. Ellman had retired from Glynde, and was living in Lewes. At the time to which we refer, Mr. Ellman was walking through Glynde, an elderly peasant was in the road, when the subject of our Memoir walked up, and with all the feeling of friendship, shook the old man by the hand; for a long time we saw them conversing, and when they parted we saw the tear of affection rolling down the furrowed cheek of the peasant, and heard him exclaim, 'God bless you, my good old master!' This circumstance, trifling as it may appear, was in accordance with the feelings of the whole parish."

We agree with the writer, these unprepared incidents tell a tale more eloquent than volumes of elaborate eulogy. We may add, that since his decease many a countryman has sought permission from Mrs. Ellman to look upon his old master's picture, and wept, not bitterly but abundantly, before it. Mr. Ellman died at his house at Lewes on the 22d day of November, 1832, it may be added, suddenly; for though he had not for some short time previously enjoyed his wonted health, none of those immediately surrounding him anticipated so speedy an approach to the fatal climax. We have already observed that on the death of Richard Astley, Mr. Ellman was father of the Smithfield Club, and his memory was proposed at the subsequent December meeting by the Duke of Richmond, who, with a voice tremulous with emotion and a manner the most impressive said, that the country had lost a public character, one who, standing aloof from the factious strife of party politics and free from self-seeking ambition, had throughout his long life postponed his own interest to that of others; and who had never, like too many, assumed the garb of patriotism as a cloak for personal deficiences, or for purposes of personal advancement. Long may his memory live in the hearts of his children and his friends.—*Memoir of Mr. Ellman.*

We regret that the nature and limits of this volume have checked us from indulging in more copious extracts from the interesting memoir which supplies the foregoing particulars of our great agriculturist. Where the whole is excellent it is no easy task to separate and give a preference to particular parts. The passages however which have been considered more appropriate to this publication are those which refer directly to the life and character of Mr. Ellman, though it must be confessed that the remarks and incidental circumstances connected with the subject of this memoir are so admirably blended with the passages quoted, that the latter must necessarily lose a portion of their interest by the separation. We therefore beg to refer to those who are not satisfied with these brief extracts to the memoir itself published in the third edition of *Baxter's Library of Agricultural and Horticultural Knowledge,* from which highly approved work this sketch of Mr. Ellman's life has been taken.

HORTICULTURE.

PRINCIPLES OF HORTICULTURE.

A bud is the minature of all the parts that are afterwards formed from it. It consists of the germs, the first rudiments of these parts; which lie in the bud in a dormant state till the appointed season, when the development begins, and proceeds in all its glory.

Buds are of two kinds: *leaf-buds* and *flower-buds*. The former are small, long, and pointed; the latter are short, thick, and round. Leaf buds are convertible into flower-buds; a fact of the greatest importance, which was accidentally proved by the following circumstance:—The *Solandra grandiflora*, a native of Jamaica, had long been cultivated at Kew, in the stoves, being well supplied with water, without showing any signs of flower or of fruit. One plant was left by accident in a dry stove, and the consequence was, that the branches were much stinted in their growth, and that flowers were produced. The experiment has been frequently tried, and with success. The supply of the nutritious juices was in this case diminished, and consequently the plant at its first development no longer exhausted all its energy, but, gradually having attained power, produced flowers and fruit. It is on this account that the *transplanting* of fruit trees is frequently had recourse to in order to make them produce fruit. The roots in the process of transplanting have been injured, the supply of sap is consequently diminished, the plant does not increase in size, but propagates its kind by the production of flower-buds. The process of *dwarfing* is another illustration of the fact that leaf-buds can be converted into

flower-buds: since when a rank-growing fruit tree is engrafted on a slow-growing stock, the engrafted branch will, from the scantiness of the supply it receives from the slow growth of the stock, come earlier into fruit than if it had been supplied with abundant nourishment. Indeed, every thing that checks the luxuriance of supply in regard to the sap, tends to the formation of flower-buds, and consequently of fruit and of seeds: and this checking is generally effected by scoring the bark to the wood very deeply with a knife, by twisting wires round the stem and branches; by cutting off a cylinder of the bark and replacing it with a bandage; also by exposing a portion of the roots of the tree during winter, so as to diminish their vigour. 'In some standard fruit trees, *honeysuckle*, indeed, (says Dr. Walker, in his Economical History of the Hebrides, ii. p. 228), may be applied with great advantage; these, when even of considerable age, do sometimes continue to run so much to wood, and especially towards the heart of the tree that it remains quite unfruitful. To plant a vigorous honeysuckle at the foot of such a tree is an easy, effectual remedy, and much better than any pruning. The honeysuckle grows up, occupies the heart of the tree, checks its luxuriance, directs its vegetation towards the extremities, and renders it fruitful. A large apple tree of the above description, above fifty years old, and which had always been barren, was rendered by this practice extremely fruitful. When this end is answered, which will happen in a few years, the houeysuckle should then be removed before it becomes injurious.

Those concerned in plantations may derive much practical benefit from the proper application of this fact. Thus, when a very young tree exhibits flowers and produces fruit, a premature decay and death are indicated. Hence nourishment in these cases should be supplied. When the young fir-tree produces cones, it is from the soil not being favourable to its growth.

Leaf-buds and flower-buds both agree in one respect, namely, that they may be removed to another stock with success; differing, however, in this, that the leaf-bud only will shoot forth or vegetate when removed from its original situation and placed in the earth. The former operation is called *budding* or *inoculation;* and what is very curious, that the bud preserves all its peculiarities, while the stock remains unchanged; the crab, on which the finest apple has been inoculated still remains a crab. In some cases, five or six different species of fruit being budded on the same tree, afford, when in fruit, a most pleasing spectacle. The gardener is aware of the difference between *budding* and *grafting;* the latter being the introduction of a small *branch* into another stock of the *same genus* or kind. And it is equally well known, and Miller asserts the same, that those trees only can be grafted on each other with success, that belong to the *same tribe;* a circumstance in which the animal and vegetable kingdom agree.

It is pleasing to notice the care which the Creator has taken of buds, in giving them covering suited to the season of the year in which they are put forth, and to the climate in which they grow. In northern

regions the buds are clothed with scales or with a downy substance, sometimes with both, and sometimes a coating of resin is added. Most have observed the bud of the horse-chestnut. This tree may in its budding be said even to anticipate the spring; and see how its bud is protected, it is covered with a dozen pair of scales, one lying over the other so as to make a kind of tile work, the outer scales being hardest, and the surfaces united together by a resinous varnish. By these means the bud is defended from the inclemencies of the season. The preserving influence of these circumstances is evidenced by the fact, that, if a horse-chestnut bud be gathered before it has begun to be unfolded, and the point at which it was separated from the tree be coated with sealing-wax, and then immersed in water, it will remain there for years without undergoing any change. In warm countries, on the other hand, buds have few or no protecting scales. In tropical regions, the rapidity and luxuriance of growth are such, that the preparatory stage of the formation of buds, which generally takes place about the midsummer of the preceding year, seems scarcely to occur.

Such is the brief history of this interesting exhibition of vegetable life.

ON THE CULTIVATION OF THE GRAPE VINE ON OPEN WALLS.

BY CLEMENT HOARE.

Vines are now cultivated in this country only against walls, upon the roofs of buildings, and under glass. The expence attending the growing of grapes under glass, is such, however, as obviously to place this method out of the reach of the mass of the people; and vineyard culture, now that it has fallen into disuse, is perhaps, considered so much in the light of a commercial speculation, that those who possess the means of practising it, are deterred from employing them, from an apprehension that the risk and uncertainty attending it, would prove more than sufficient to counterbalance its advantages. But the cultivation of vines on open walls being free from these and all other objections, presents an advantageous method of producing grapes, which may be embraced by every person who has at his command a few square feet of the surface of a wall. This mode of culture indeed, offers to possessors of houses, buildings, and walled gardens, and even to the most humble cottager, ample means of procuring with the greatest certainty, an abundant supply of this most valuable fruit. It is not too much to assert, that the surface of the walls of every cottage of a medium size, that is applicable to the training of vines, is capable of producing annually, as many grapes as would be worth half the amount of its rental. Every square foot of the surface of a wall,

may in a short space of time, be covered with bearing wood, sufficient to produce on an average, a pound weight of grapes, and I have frequently grown double that quantity on the same extent of surface.

The grand parent error which prevails universally in the cultivation of the vine on walls, lies in the method of pruning usually adopted, and this is undoubtedly the consequence of the nature of the plant and its peculiar characteristics being in general, but little understood.

In the course of the growing season, a vine in a healthy condition, will make a quantity of bearing wood sufficient to produce ten times as much fruit as it can bring to maturity. When this fact is considered in connection with another; namely, that the wood which bears fruit one year, never bears any afterwards, and is therefore of no further use in that respect; it will easily be seen to what a surprising extent the pruning knife must be used, to get rid of the superabundant wood which the plant annually produces. But nine parts out of ten of the current year's shoots, and all those of the preceding year, if possible, to be cut off and thrown away, is apparently so much beyond all reasonable proportion, and the rules usually observed in pruning other fruit trees, that few persons ever possess the courage to attempt it. And herein, lies the capital error in the common method of managing the vine.

A vine in the third or fourth year of its growth, will in general shew a few bunches of grapes, and these are usually suffered to remain and ripen, instead of being plucked off as soon as they appear, having been produced before the plant has sufficient strength to mature them without injury to its constitution. Although the quantity be small, it inflicts a severe blow on the vital energies of the vine, from the exhausting nature of the process of maturation.

There is not a single point of culture in the whole routine of the management of a vine, the knowledge of which is of so much importance, as that which enables the cultivator to ascertain with precision the greatest quantity of fruit he can annually extract from it, without checking its growth, or injuring its vital powers.

From the results of numerous experiments carefully registered from year to year, it appeared clearly that the capability of the vines to mature fruit was in direct proportion to the circumference of their respective stems.

The following is a scale of the greatest quantity of grapes, which any vine can perfectly mature, in proportion to the circumference of its stem, measured just above the ground.

Cir.	lbs.	Cir.	lbs.
3 Inches	5	7 Inches	45
3½ ditto	10	7½ ditto	50
4 ditto	15	8 ditto	55
4½ ditto	20	8½ ditto	60
5 ditto	25	9 ditto	65
5½ ditto	30	9½ ditto	70
6 ditto	35	10 ditto	75
6½ ditto	40		

No vine is taken cognizance of, until its stem measures three inches in girth, as under that size vines ought never to be suffered to ripen any fruit. This is a rule that should be strictly adhered to in the management of young vines, for it may be safely asserted, that for every pound weight of grapes extracted from a vine before it has grown to that size, ten pounds will be lost during the next five years, independently of the very severe check which is given to its growth by premature bearing. But by husbanding its strength till its roots have multiplied sufficiently to provide a full supply of nourishment without suffering from exhaustion, the plant commences its fruit bearing life with a degree of vigour, which lays a sure foundation for its future prosperity.

The manner in which it is intended that this scale should be practically applied, is to measure the stem of a vine at the autumnal pruning, and to retain no more good well-ripened fruit buds than is supposed necessary to produce the given weight of fruit which corresponds to its girth. And if there should be any excess above that quantity in the ensuing summer, the crop must be reduced to the given weight, by cutting off a sufficient number of bunches as soon as the blossoming is over and the fruit set, as the weight of it when ripened may then be easily estimated.

With respect to the number of buds, that are necessary to be left at the autumnal pruning to produce any given weight of fruit, I have found it to be a good general rule and applicable to all those sorts of grapes usually cultivated on the open wall, to consider every bud (rejecting the two bottom ones on each shoot) as equal to the production of half a pound weight of fruit;—that is, if the stem of a vine measure five inches in girth, its capability is equal to the maturation of twenty-five pounds weight of grapes, and therefore the number of buds to remain after pruning will be fifty.

Aspect.—I have no hesitation in stating, from experience and observation of the qualities and flavor of the fruit of the different vintages for many years past, that the best aspects in which grapes can be brought to the highest degree of perfection on the open wall, that the latitude and climate of the southern parts of England will permit, are those that range from the *eastern* to the *south-eastern* both inclusive, the last of which, indeed, may be considered the very best.

Soil.—The natural soil which is most congenial to the growth of the vine and to the perfection of its fruit in this country, is a light rich sandy loam not more than eighteen inches in depth, on a dry bottom of gravel, stones, or rocks.

One of the principal causes of grapes not ripening well on the open wall in this country, is the great depth of *mould* in which the roots of vines are suffered to run, which, enticing them to penetrate in search of food below the influence of the sun's rays, supplies them with too great a quantity of moisture; vegetation is thereby carried on till late in the summer, in consequence of which, the ripening process does not commence till the declination of the sun becomes too 'd to afford a sufficiency of solar heat to perfect the fruit.

All borders, made expressly for the reception of vines, ought to be composed of a sufficient quantity of dry materials, such as *stones; brickbats, broken moderately small; lumps of old mortar; broken pottery, oyster shells, &c. &c.** to enable the roots to extend themselves freely in their search after food and nourishment; to keep them dry and warm by the free admission of air and solar heat; and to admit of heavy rains passing quickly through, without being retained sufficiently long to saturate the roots, and thereby injure their tender extremities.

In preparing the border, then, the first thing is to secure a dry bottom. If the soil and sub-soil be naturally such as is described above as the most congenial to the growth of the vine, nothing more is required than to trench the ground two spit deep, to clean it well from all weeds and roots, and to make it as fine as possible, and it will then be in a proper state to receive the vines.

It will prove very beneficial to the growth and fertility of the vines

* [From observations made by Mr. Busby during a recent visit to the vineyards of Spain and France, it appears that the *finest dry wines* are invariably produced from grapes grown on a *calcareous* soil. "The Albariza soils," Mr. Busby observes, "contain generally about 70 parts carbonate of lime, in some places almost *pure* carbonate of lime," and in his concluding observations he remarks, "I cannot refrain from observing that from the Albarizas of Xeres, the most southern vineyards of any reputation in Europe, to those of the chalky hills of Champagne amongst the most northern, I met with no vineyard producing dry wines of reputation which was not more or less calcareous. Although it is acknowledged that two-thirds of the vineyards of France are situated upon soil more or less calcareous, by Chaptal and other writers upon the subject, they have stated that, provided the soil is porous, free and light, its component parts are of little consequence, and they enumerate granitic schistose, argillaceous, flinty, sandy, and calcareous soils as equally well qualified to produce, and as actually producing, in different parts of France, wines of the finest quality. It appears evident to me, however, that these writers have, in many instances been misled by the representations which have been transmitted to them, as for instance, when Chaptal and Cavoleau cite the wine of Hermitage as an instance of the excellence of wines produced upon the debris of granite; while the fact is, that the wine of the hill of Hermitage owes it superiority over the wines of the other hills of its neighbourhood only to the circumstance of the granitic soil of a part of that hill being mixed with calcareous matter, and but for this circumstance, I am satisfied that the wine of Hermitage would never have been heard of beyond the neighbourhood where it grows. I am therefore of opinion, that the finest dry wines owe their superiority chiefly to the quality of the soil; and I am much mistaken if it be not found that the soils of all vineyards producing dry wines of superior excellence are strongly calcareous. All my observations have led me to this conclusion, and I know of no instance to the contrary. It will be observed, that I here only speak of dry wines, for sweet wines of great excellence are produced in a variety of soils, and, in fact, owe their qualities more to the variety of the grape and the manner in which it is treated, than to the soil. The sweet *Muscat* and *Old Mountain* wines of Malaga are celebrated all over the world, but though they have the same varieties of vines at Malaga as at Xeres de la Frontera, and pursue a similar practice in making the wine, the best of their dry wines produced on a soil consisting of decomposed slaty schist, are insipid and flavourless when compared with the Sherries which are produced on the chalky hills of Xeres."—*Busby's Journal of a recent visit to the Vineyards of Spain and France.*

These valuable remarks of Mr. Busby, may, we think, be turned to good account by the cultivators of the vine in this country. In all cases where the soil is destitute of calcareous matter, the substratum should be formed of chalk or limestone in preference to the introduction of miscellaneous materials.]—Ed.

and to the flavor of the fruit, if the border in which they are planted be never cropped nor digged.

Manure.—Of those manures, that may be mixed with the soil when the border is first made, the best are such as possess the two valuable qualities of affording to the roots of the vine, *the highest degree of nourishment* combined with *the greatest permanency of duration.* Of this description are bones, horns and hoofs of cattle, bone dust, the entire carcases of animals, cuttings of leather, woollen rags, feathers, and hair.

As a point of culture of great importance to be attended to in depositing manure in the soil, care must be taken not to dig it in too deeply. The roots of vines should be induced to extend themselves in a horizontal manner and as near the surface of the border as possible. Solar heat is generally supposed to penetrate to the depth of three feet, but its effects at that distance from the surface cannot be very strong, especially in soils that are of an adhesive nature. The food therefore that is provided for the roots of vines, should lie imbedded in the soil in the form of a horizontal stratum or layer, the top of which should be about six inches, and the bottom not more than two feet, below the surface. Manure so deposited, will cause the roots to spread themselves out within such a distance of the surface as will keep them warm and dry, and enable them to receive the cherishing influence of the sun and air.

On the construction of Walls.—To ripen any of the sorts of grapes cultivated in this country sufficiently to be used as table fruit, requires the shelter and reflected heat of a wall.

If walls be built for the express purpose of producing grapes, the most judicious expenditure of the materials will be in the erection of several low walls, not more than six feet high, in preference to a small number of very high walls. For the purposes of pruning and training, and the general management of the vines, walls of this height are far more convenient than those of a greater height: and if built to run directly north and south, the entire surface of both sides of each wall will be available for the training of the vines, and as such walls need not be built at a great distance apart, an astonishing quantity of grapes may be thus annually grown on a small extent of ground by the erection of a few walls of this description, built parallel to, and not far distant from, each other. The best *materials* for the construction of vine walls, are without doubt *bricks*, as they present a more even surface than can be obtained from walls built of any other description of materials; and evenness of surface is a quality that cannot be dispensed with. It is not only necessary for the training of vines with precision, but if the surface of the wall be not smooth and even, the grapes will be at times considerably injured by being blown to and fro by the wind against the rough and uneven parts of it.

Projecting copings fixed on vine walls, though attended with many advantages are not without some disadvantages.

Nevertheless, the advantages decidedly preponderate. If there were

no other benefit arising from them, that of protecting the fruit from heavy rains, and thereby keeping it dry and in good condition for two or three months after it is ripe, would be quite sufficient to turn the scale at once in their favour. With respect to the width of the projecting part when permanently fixed, that must depend on the aspect and height of the wall. If the latter be *less* than four feet and the aspect *south*, the coping ought not to project at all, as the light and solar heat excluded by it will be a serious drawback on the healthy vegetation of the vines. But if the wall be four feet high, then the coping may project as many inches, and if this width be increased an inch every foot that the wall increases in height up to twelve feet, the principal advantages arising from the protection which a coping affords, will be secured in conjunction with the smallest portion of its disadvantages. If the wall therefore be twelve feet high, the coping will project a foot, more than which no coping should project, whatever may be the height of the wall.

Moveable wooden copings may be used with great advantage, as they produce all the benefit of fixed copings without any of their disadvantages. Copings of this description may project a little more than the proportions above-mentioned, those being intended to apply to *fixed* copings only. If temporary copings be used, the proper periods of the year for their application will be as follows; 1st. from the twenty-first of March to the middle of May; to protect the young shoots from the injurious effects of late frosts and from descending cold;—2ndly. from the first expanding of the blossoms until the berries are well set;—and 3rdly. from the period of the berries becoming transparent and shewing symptoms of ripening, until the fruit be all cut from the vines. During this last mentioned period, the coping will prove of the greatest advantage in keeping the fruit *dry*, for it may be remarked, that as soon as grapes begin to make their last swell, which is indicated by their becoming transparent; not a drop of rain should ever be suffered to fall upon them if it can possibly be avoided.

Propagation of Vines.—Vines are propagated in the open ground, by layers, and by cuttings; but the latter is by far the best method of propagating vines in the open ground, when the plants are either to be raised in the situation where they are finally to remain, or to be transplanted in the ensuing winter, or at any subsequent period. To provide cuttings to be planted at the proper season, select at the autumnal pruning, a sufficient number of shoots of the preceding summer's growth. Choose such as are well ripened, of a medium size, and moderately short jointed. Cut them into convenient lengths of six or eight buds each, leaving at the ends not less than a couple of inches of the blank wood for the protection of the terminal buds. Stick these temporary cuttings about nine inches in the ground, in a warm and sheltered situation, where they will be effectually protected from the severity of the winter. The best time to plant them out is about the middle of March, but any time from the first of that month to the tenth of April, will do very well. When this period arrives, if the young vines about

to be raised are afterwards to be transplanted, choose such a situation for the planting of the cuttings, as is well sheltered from the wind, and not too much exposed to the sun. More than six hours sunshine in any day will be injurious rather than beneficial, and with respect to the wind, if the cuttings be not protected from its injurious effects, they will scarcely strike at all, even in the very best prepared soil. A moderate portion of sunshine, and effectual shelter from the wind, are absolutely necessary to ensure the growth of the cuttings. Previously to planting them, the soil must be well prepared for their reception, by being digged to the depth of eighteen inches, and the earth made *very fine*. If it be in any degree stiff or heavy, take two thirds of it entirely away, and supply its place with light rich mould, or road scrapings. For every cutting add half a spit of well-rotted dung from an old cucumber bed, and mix the whole well together, making it as fine as possible. This being done, prepare the cuttings in the following manner. Cut the shoots into lengths containing two buds each, and let the uppermost buds have an inch of the blank wood remaining beyond them. The extremities of these must be cut in a slanting manner, and the slant sides be opposite to the buds. Take the other ends of the cuttings that are to be inserted in the ground, and cut them transversely *just below the buds*, and the cuttings will be complete. The pruning knife should be very sharp, so that the cuts at the ends may be perfectly smooth. The length of each cutting betwixt the two buds should not be less than *four*, nor more than *six* inches, in order that the bottom buds may be at such a distance from the surface of the soil, as will best promote their vegetation.

The cuttings being thus prepared, must be planted immediately, for which purpose make holes in the ground (about a foot apart each way, if the plants when raised are to be subsequently transplanted) with a stick about the size of the cuttings, and insert the latter so that the uppermost buds shall be just even with the surface of the ground. Press the mould close round each cutting, in order to prevent the sun and air drying up its juices. If the mould should subsequently sink down, and leave the buds above the surface, more must be added to keep them even with it. After the first of May, care must be taken to keep the soil round the cuttings constantly moist. For this purpose supply each cutting as often as required, according to the state of the weather, with about a pint of soap suds; and continue so to do, until it has formed a communication with the soil, which will soon be rendered apparent by the protrusion of a shoot, and its daily elongation. When the bud bursts, the process of evaporation commences, and if the moisture in the cutting be consumed quicker than the latter can absorb it from the soil, the young leaves turn yellow and die, and the vitality of the cutting is destroyed. It is indispensable, therefore, that the soil round each cutting should be constantly kept *moist*, in order that the latter may absorb sufficient nourishment to supply the bud with food, until, by the emission of roots it has established a communication with the soil, and is thereby enabled to feed itself. As soon

as the cuttings have protruded shoots about three inches long, and their leaves have a healthy appearance, watering may cease for a time, but throughout the summer when the weather is dry, the young plants should be assisted in their growth by the moderate application of liquid manure. Soap suds are the best for this purpose, but dung water will do very well, provided it be not too powerful. The surface of the soil round the cuttings should never be allowed to cake or get hard, but should be kept open and in a fresh and finely pulverised state, by being, as often as necessary, forked lightly up. As the shoots advance in growth, they must be constantly kept staked, or nailed to the wall; the tendrils should be cut off as soon as they are about four inches long and the lateral or side shoots kept pinched back to one eye. At the fall of the leaf cut every plant down to the two lowermost buds.

Pruning and Training.—These operations are so closely connected and so mutually dependent on each other, that they almost constitute one operation. In pruning a vine, regard must be had to the manner in which it is afterwards to be trained; and in training it, the position of the branches must in a great measure be regulated by the mode in which it has previously been pruned.

There are three methods of pruning the vine, in practice amongst gardeners; namely, *long pruning*, *spur pruning*, and the *fan or fruit tree method*. The first is the most eligible method of pruning the vine, which, with respect to this point of culture, requires to be treated very differently to every other description of fruit tree cultivated in this country.

The superiority of this mode of pruning will be obvious when we take into consideration that the *old wood* of a vine or that which has previously borne fruit, is not only of no further use at any subsequent period, but is a positive injury to the fertility of the plant. The truth of this remark depends on the fact, that every branch of a vine that produces no foliage, appropriates for its own support, a portion of the juices of the plant that is generated by those branches that *do* produce foliage.

As the sole object in view in pruning a vine is to increase its fertility, *the best method to accomplish this, must be that which leaves a sufficient supply of bearing shoots, on the least possible proportionate quantity of old wood*, and that object is undoubtedly best accomplished by a system of long pruning.

Before entering on the subject of Training a few general rules may be advantageously laid down for the guidance of the pruner.

1st.—In pruning always cut upwards and in a sloping direction.

2nd.—Always leave an inch of blank wood beyond a terminal bud, and let the cut be on the opposite side of the bud.

3rd.—Prune so as to leave as few wounds as possible, and let the surface of every cut be perfectly smooth.

4th.—In cutting out an old branch, prune it even with the parent limb, that the wound may quickly heal.

5th.—Prune so as to obtain the quantity of fruit desired, on the smallest number of shoots possible.

6th.—Never prune in frosty weather, nor when a frost is expected.

7th.—Never prune in the months of March, April, or May. Pruning in either of these months causes bleeding, and occasions thereby a wasteful and an injurious expenditure of sap.

8th.—Let the general autumnal pruning take place as soon after the first of October as the gathering of the fruit will permit.

Lastly.—Use a pruning knife of the best description, and let it be, if possible, as sharp as a razor.

On the Training and Management of a Vine during the first Five Years of its Growth.—The best time of the year to transplant a vine, is immediately after the fall of the leaf; the longer its removal is postponed after this period, the later in the ensuing spring does it begin to vegetate. The ground in which it is to be planted, must be prepared agreeably to the directions previously given. This being done, dig a hole for the reception of the vine, about two feet deep, and of the same width and length; and if, after the plant is taken up, its roots should prove too long for this, the size of the hole must be increased, as on no account must the roots be crippled in their extension. Loosen the sides and bottom of the hole, and to the soil that is taken out, add a couple of spits of well rotted dung and mix the whole well together, making it very fine. Put the mould into the hole again to within nine inches of the top, and it will be ready to receive the vine. This must be now carefully taken up, with its roots as entire as possible, and if any of them be bruised or in any way injured, they must be pruned back to the sound parts; fix the vine in the hole with its stem about three inches from the wall, and let the bottom bud be just even with the surface of the ground. Spread the roots out in a horizontal direction at equal distances from each other, and in a similar manner to the spokes of a fan, and then fill the hole with the mould nearly to the top. Take hold of the stem, and, drawing it upwards a little, give it two or three good shakes with the hand, that the mould may settle well round the roots; after which, fill up the hole with the remainder of the mould, cut the vine down to the two bottom buds, and the operation will be completed.

Assuming now that the vine thus transplanted is a young one, it may be considered equal in its growth to one raised from a layer or cutting in the preceding summer; its future culture will be here taken up at the autumn of the first year, and after it has been cut down to the two lowermost buds, as previously directed.

First year; Dec. 1st. As long as the weather remains open, the soil round the roots should not be covered over, but as soon as frost comes, a good covering of litter, or of well rotted stable manure must be laid over the ground as far as the roots extend, and if the weather be very severe, it will be better also to cover over the stem, to the depth of five or six inches above the top of it. The young plant being

thus well protected from the severity of the winter, may remain in this state till the first of March.

Second year; March 1st. Remove the covering, and fork up the surface of the ground, to the depth of two or three inches, that the sun and air may freely penetrate it.

April 1st. Keep the soil round the roots free from weeds, and the surface of it loose, either by raking or forking it up as often as necessary.

May 1st. Now, remember, that only a single shoot is permanently to be trained throughout the summer, the object of leaving two buds in the previous autumn, being to provide against the loss of a shoot in case of any accident. As soon, therefore, as the strongest has grown sufficiently to be out of danger of being accidentally rubbed off, the other is to be cut out as hereafter directed. If any other shoots have pushed besides the two principal ones, rub them all off. As soon as the shoots have grown about a foot in length, nail them to the wall. Do this very carefully, for they are, as yet, extremely tender. When they have grown about six inches from the last nailing, they must again be nailed, and continually kept so, never suffering the tops of the shoot to be blown about by the wind. As the tendrils and lateral shoots successively appear throughout the summer, pinch off the former when they have grown about three or four inches in length, and the latter to an inch beyond the first eye.

June 1st. Throughout this month and the two following ones, whenever the ground appears parched through the heat of the weather, give the roots, once a day, about half a gallon of soap suds or dung water. Keep the ground free from weeds, and the surface loose and open, by raking or forking it up once a week throughout the summer.

July 1st. The young shoots being firmly united to the preceding year's wood, and therefore past all danger of being broken off by any accident, unnail the weakest shoot of the two, and cut it out close to the stem, making the surface of the wound quite smooth and even. The remaining shoot must be kept nailed to the wall as before directed.

Nov. 1st. Cut the vine down to the two lowermost buds, and in the winter, if the weather be frosty, cover the ground over in the same manner as in the preceding winter.

Third year; March 1st. Remove the winter covering, and fork up the surface of the ground, and let the subsequent management throughout the season, be precisely the same as in the preceding summer. If any fruit be shewn, pinch it off immediately it appears.

Nov. 1st. The stem of the vine will now be more than two inches in girth, and therefore *two* leading shoots are to be permanently retained in the next year. For this purpose, cut the vine down now to the *three* lowermost buds, thus reserving, as before, one to spare in case of accident. The roots being now sufficiently strong to withstand the severity of the weather, will not in future require to be covered.

Fourth year, March 1st. Clean the surface of the ground and fork

it up lightly, and let the subsequent management throughout the season be the same as before, unless directed otherwise.

May 1st. As soon as the shoots have attained a sufficient length, nail them carefully to the wall, and rub off all others, if any should have pushed. If fruit be shewn, pinch it off as in the preceding year.

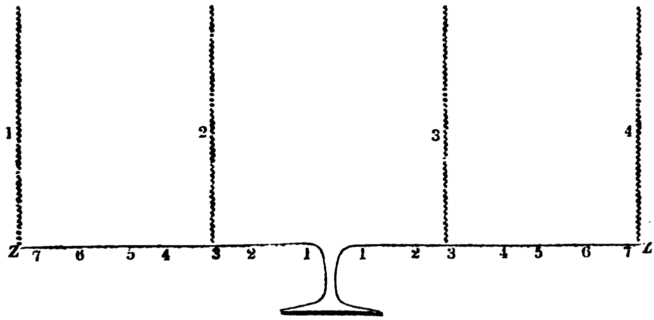
July 1st. Unnail and cut out the weakest of the three shoots, and train the two remaining ones carefully during the remainder of the season.

Sept. 1st. Pinch off the tops of the shoots.

Nov. 1st. As the girth of the stem will not be less now than three inches, the vine may be permitted to mature the fruit the next year, not exceeding five pounds weight. For this purpose, cut down the two shoots to the *seven lowest buds* each, prune away the remaining portions of the tendrils and dead wood close to the shoots, and cut out carefully all the lateral shoots close to the base of the buds whence they have sprung. If the outer bark of the stem be decayed peel it off clean, and then nail the shoots to the wall in a temporary manner.

Fifth year. February 1st. As soon after this time as the weather is open, cut out of each shoot, the *first*, *second*, *fourth*, *fifth*, and *sixth* buds; then bend the two shoots carefully down and secure them in a horizontal position, similar to that represented by the shoots Z Z fig 1.

Fig 1.



March 1st. Clean the surface of the ground, and fork it up as in the preceding year.

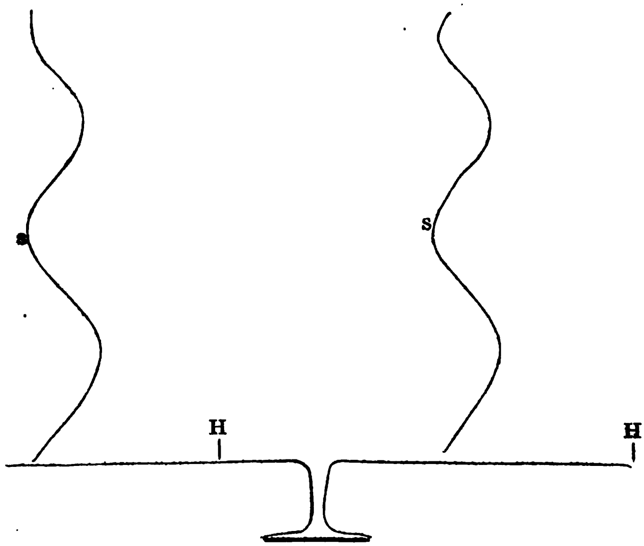
May 1st. Train the shoots that push from the buds 3 and 7, on each side in a perpendicular direction in the manner represented by the dotted lines 1, 2, 3, 4, and if more fruit shews than is equivalent to the weight before mentioned, the excess must be cut off when the berries are set, as directed in the Calendarial Register, July 15th. Continue the same course of management as in the preceding year, and when the roots require watering, they are now sufficiently strong to have applied to them for that purpose, any description of liquid manure that can be most conveniently obtained.

Sept. 1st. Pinch off the tops of the shoots, and the sap will then accumulate in the buds.

Oct. 1st. As soon after this time as the fruit is gathered, cut back the *first* and *third* shoots to as many buds as may be deemed necessary to produce the quantity of fruit which the vine can mature in the next year; and the *second* and *fourth* shoots to the lowest bud each. Cut out the lateral shoots and the stumps of the tendrils, as directed in the preceding year, and peel or scrape off all loose and decayed bark; then nail the shoots temporarily to the wall to protect them throughout the winter.

Sixth year. March 1st. Train the two shoots in the manner represented by S S fig 2, and as those push from the spurs H H, train them

Fig. 2.



also in a similar form. Clean the surface of the ground, and fork it up as in the preceding year. The Calendarial Register will now supply details of the future management.

The vine has now assumed the form which it is permanently to retain, and the manner in which it is trained, may be considered as the commencement of a system of alternately fruiting two shoots, and training two at full length for bearing wood in the following year; which method may be continued every year without any alteration, until the capacity of the vine is equal to the maturation of more fruit, than can possibly be borne by two single shoots; which, on an average, may be estimated at sixty pounds weight annually.

Weekly Calendarial Register.—*April.*—During the first week of this month examine the buds carefully, to see if any are impeded in their growth, in consequence of the shoots having been nailed too closely to the wall or otherwise. In dry weather, fork up the border to the depth of a couple of inches, that it may be loose and open, to receive the full benefit of the sun and air.

8th. Look carefully again over all the buds, and if any be confined, and have not sufficient room to push their shoots freely, give them relief immediately.

15th. Some of the buds will now be unfolded two or three inches in length, and the leaves as they increase in size, will part with their variegated tints, and gradually assume their permanent colors. The small buds which frequently accompany the principal ones, should now be rubbed off.

22nd. Such shoots as have grown four or five inches in length, will shew all the bunches of fruit which they will bear in the current season. Continue to examine the young shoots to see if any of them are crippled or obstructed in their growth, and if so, give the necessary relief.

29th. If any small or secondary buds still remain, rub them off immediately, as they will now impede the growth of the young shoots.

May 6th. The shoots will now grow rapidly, and the bunches of fruit unfold in quick succession. Continue to look over the former, and to remove any thing that may obstruct their growth.

13th. The shoots will now be of sufficient length to be nailed to the wall. With respect to this operation, the rule to be observed, is, never to suffer any shoot to grow more than twelve inches without nailing it, to protect it from the injurious effects of the wind, and to give it the benefit of the warmth of the wall by close contact. This operation must be performed very carefully throughout this month, as the young shoots are extremely tender and brittle. There will be many shoots emitted from different parts of the vine, that will neither shew fruit, nor be of a sufficient size to be retained for future bearers. All such must be now rubbed off, unless foliage be required to cover any adjacent bunches of fruit, in which case, pinch the tops off at the second or third joint, and they will not then require to be nailed. In managing the vine throughout the season, be careful to observe this general rule; that every operation in which the shoots, leaves, or fruit are concerned, must be performed when the weather is dry, and after the dew is dissipated in the morning, and before it begins to fall in the evening.

20th. Nail the shoots that shew fruit, and that are intended to be cut out at the next autumnal pruning, sufficiently near to each other, to cause their leaves, when they attain their full size, to form a continued unbroken surface, which will be hereafter of the greatest service in protecting and maturing the fruit. But such shoots as are intended to be trained for future bearers, must have as much of the

clear surface of the wall to themselves as possible, never less, indeed, than five inches on each side of every shoot.

The whole crop of grapes will have shewn previously to this time. Many shoots will show three bunches of fruit, and here and there, on some, will be found even four.

27th. The shoots will now push so rapidly, as to require almost daily inspection. Nail the future bearers firmly, and if any of them be disposed to grow long jointed, bend them a little out of their former direction, every time they are nailed; this will soon check their growth, and ensure the development of full sized fruit buds.

The *tendrils* that push from the footstalks of the bunches of fruit, must now be pinched off.

The *lateral* or *side shoots*, also, which are now pushing vigorously, must be pinched off about an inch beyond the first joint, as soon as they are about *four* inches in length, but such as are near any bunches of fruit, should not be thus topped, till they are about *six* inches in length, as their foliage will then be of greater use in protecting the fruit. It must be observed, that the lateral shoots are not on any account to be pulled off, as they are intimately connected with the organization of the buds; being evidently intended to carry off the superabundant sap generated at the joints of the shoots, and to return to them an increased portion of elaborated juice.

June 3rd. The *tendrils* will now grow rapidly, and must therefore be attended to without delay. As soon as they are about six inches long, pinch them off to within about half an inch of the shoots. If neglected, they will in a short time entwine themselves round the adjacent shoots, and cripple them.

Keep the surface of the border open, and free from weeds, as before directed.

Now, as the comparative size and vigour of the young shoots will be distinctly seen, select for future bearers, the largest and most vigorous shoots, and such as are round, and short jointed, and that are appropriately situated nearest to the stem of the vine. Nail all such very firmly to the wall, and, as before directed, suffer no other shoot of any description to be trained within five inches of any one of these. On the careful observance of this point of culture, depends the certainty of the next year's crop.

This is the earliest period that any part of the old wood of the vine can be cut out without the risk of bleeding. If, therefore, too much of the preceding year's wood has been inadvertently nailed in, or if any other cause exist, that may render it necessary to take off any of the principal limbs of the vine, they may now be cut out with safety.

10th. As the shoots will now be pushing with the utmost vigour, all such as have fruit on them, and that are not intended to be retained for future bearers, must be pinched off about an inch beyond the first joint above the last bunch of fruit. The object in view in doing this, is to prevent, as much as possible, any unnecessary expenditure of

sap, and, also, to cause it to flow with greater force into the fruit, and the future bearing shoots. This operation being performed, all nailing will now cease, except that required for the future bearers. If any useless shoots are to be found in any part of the vine, rub them off immediately.

17th. The vegetation of the vine being now in its highest vigour, daily inspection will be necessary. The future bearing shoots, being, in general, upwards of three feet in length, and having full sized leaves, the wind has a proportionate power over them, and unless kept firmly nailed to the wall, they will be in great danger of being blown down and broken off, if a high wind should arise. To prevent this, nail them hereafter every nine inches of growth, with strong linen or cotton shreds, doubling the edges over, and driving the nails with considerable force through the four thicknesses. Take care, also, to drive the nails on each side of every shoot in alternate succession, so that no two following nails shall be on the same side of any shoot.

July 1st. The fruit being now in full blossom, will yield a most delightful fragrance. Take care that the bunches are not handled, nor in any way disturbed, till the berries are set.

The lateral shoots which were topped some time since, will now be sending forth fresh shoots from their terminal buds. Pinch off all these succession shoots just above their first joints, as before; and if any should hereafter break again, pinch them back in like manner throughout the season.

Pay great attention to the future bearing shoots, and nail them firmly as directed June 17th.

8th. Continue daily inspection, as the vine will still grow most vigorously, and, if neglected, useless shoots, laterals, and tendrils, will speedily appear in all parts of it. The bunches first in blossom, will now begin to have their berries set.

15th. Keep the border clear of weeds, by hoeing or forking up the surface, which will admit the sun's rays to pass through it, and thereby warm and cherish the surface roots.

The blossoming being now nearly over, the berries will be setting in rapid succession. As soon, therefore, as they have all grown to the size of very small peas, an estimate must be made as near as possible, of the weight which the whole crop would ultimately attain, if suffered to remain and ripen; and the excess, if any, above the quantity which the vine can mature, agreeably to the given scale, must be cut off. This is a most important operation, and one that cannot be delayed, without materially compromising the health of the vine. In some instances, the excess, perhaps, will be but trifling, while, in others it will probably be very great. I have frequently had young vines produce from eighty to a hundred full sized bunches of grapes each, which, if matured, would weigh, at least, sixty pounds; while, their individual strength was not equal to the ripening of more than a fourth part of that quantity. In such cases, three bunches out of every four, have been cut off. In reducing the number of bunches, get rid

of the smallest, and the ragged and uneven ones, if any, and also, all such as hang too far distant from the wall, to have the full benefit of the warmth and reflection of it; and select to remain, those which are largest in size and berry, taking care that they be distributed over the vine, as equally as possible.

22nd. Now that the bunches have been reduced to their proper number, examine the vine and see if there be any vacancies in the foliage, through which, any of the bunches are exposed to the direct rays of the sun; and if so, unnail the adjacent shoots, and re-nail them in such positions, as will effectually shade the fruit. If, however, this cannot conveniently be done, put a long narrow shred round the foot stalks of such bunches as are thus exposed, and, drawing them gently aside, nail them in a position, in which the adjacent leaves will shade them. In doing this, take care not to twist or injure the footstalks, nor draw them too far out of their natural direction, which would derange their functions; as, through these very slender, but beautifully constituted organs, must flow the chief part of the nourishment, required to bring the fruit to perfection. Observe, also, that in no instance, should there be more than the thickness of one leaf to shade the fruit. The solar rays, being thus transmitted through the medium of the leaves, are divested of their scorching effect, and are also modified in such a manner, as to operate most beneficially on the swelling of the berries. Grapes that are exposed to the direct operation of the sun's rays, scarcely ever attain their proper size or flavor; while, on the contrary, the finest and most highly flavored fruit, will uniformly be found, to hang in close contact with the wall. The leaves, also, not only serve as a chastened medium for the solar rays to pass through, but they prevent, in a considerable degree, the heat from escaping from the wall, and, as a necessary consequence, make the temperature of the air in which the fruit grows, warmer than that of the atmosphere. They also protect the fruit from the effects of hail, and from continual and heavy rains; which, in the latter part of the season, when the fruit is ripe, are advantages that cannot be too highly appreciated. It may, therefore, be considered as an important, and, indeed, an indispensable point of culture, that all the fruit of a vine, ought, from the moment of its coming into blossom, till it be ripened and gathered, to be shaded by a surface of continuous single leaves, so that no part of it can be seen by an observer, without pulling them aside. It is true, that the shape of the leaves prevents any species of training, so disposing them, as to present one continued single-leaf surface, but though this point of perfection cannot be attained, yet, the nearer you approach to it, the better the culture will be.

29th. Pay great attention to the future bearing shoots, which will now be of considerable length, and if not nailed firmly to the wall, will be in danger of being blown down, if a strong wind should arise. If any of them be disposed to grow long jointed, curve them in the training, which, by compressing the sap vessels, will immediately cause the sap to accumulate, and produce short jointed wood.

Keep laterals, tendrils, and useless shoots of every description, in constant check.

The grapes will now be as large as small peas, they must, therefore, be thinned on the bunches without loss of time. For this purpose provide a pair of sharp pointed scissors, that will cut well at the points; and at this first thinning, commence with the bunches that are the most forward in growth, and reduce the number of berries full one half, cutting out all the smallest, and such as are too close together, so that they may be equally distributed on the bunches.

This thinning of the berries, is one of the most necessary, and most beneficial operations, in the whole culture of the vine. No grapes can be produced fit for the table without it. It increases the size of the berries, improves their flavor, hastens the period of their ripening, by preventing their clustering, enables a vine to mature a much greater weight of fruit, and counteracts in a considerable degree, those exhausting effects, which the perfecting of it would otherwise produce on the vital energies of the plant. The primary object of every cultivator most undoubtedly be, to obtain every year in succession, the most valuable crop possible; and the qualities that confer value on a crop of grapes, are, first, *high flavor*; secondly, *large berries*; thirdly, *large bunches*; and in proportion to the degree in which these three grand requisites are combined, will the crop become really valuable. Neither high flavor, nor large sized berries, can be produced without reducing the number of them on the bunches. It is not enough that the bunches be reduced in number, so as to bring the whole crop within a given weight, but it is also equally necessary that the number of berries should be lessened; by which operation, not only is great relief given to the vital powers of the vine, during the maturation of the fruit; but the value of the crop becomes thereby doubled, and in many instances, quadrupled, in consequence of the extraordinary increase in the size and flavor of the berries.

Aug. 5th. If the weather be hot and dry, supply the border with liquid manure. This operation, which should be done in the latter part of the day, as soon as the sun has ceased shining on the border, may, if the state of the weather require it, be repeated every two or three days, from the time the fruit is first set, until it becomes ripe, and it will be found very beneficial in promoting the swelling of the berries.

12th. As the berries are now rapidly increasing in size, the thinning of them must be attended to every seven days, and if oftener, the better. This is rendered necessary, in consequence of the unequal manner in which they sometimes swell. If the berries on any given bunch be thinned, so that the remaining ones are all equal in size, it will generally be found on inspecting it five or six days afterwards, that many of them have remained in point of size, stationary; while others have grown, perhaps, twice as large as when previously thinned. In consequence of this, the bunches require frequent examination, in order that all such berries, as thus appear by their inferior size, to have been deprived of their portion of nourishment, may, as speedily as possible

be cut out. The best general rule that can be given, is, that the berries during the whole period of their growth, until after they have made their last swell, must never be suffered to cluster, or to press the sides of each other.

19th. Continue to nail the future bearing shoots firmly, and keep in constant check all tendrils, and lateral and succession shoots, throughout the remaining part of the season.

If the atmosphere be dry and arid, or if the weather be windy, evaporation will proceed at a prodigious rate, and unless the nights be still and serene, and the dews very copious, the balance betwixt evaporation will be destroyed. To supply the waste, therefore, that will be thus occasioned in the juices of the vine during this critical period, let the foliage and fruit be now and then watered after sun set, and also the border, in addition to the application of liquid manure to the latter as before directed. The atmosphere contiguous to the vine, will be thereby rendered humid, and thus offer a supply of moisture, which the foliage and fruit will quickly and most advantageously absorb.

20th. Bloom on the berries will begin to appear about this time, in consequence of which, the bunches must be hereafter handled as lightly as possible, that no more of it may be rubbed off, than can well be avoided.

Continue to use the scissors freely in thinning the berries, which must on no account be neglected, as in a few days the operation will be of no use.

Sept. 2nd. Now pinch off the extremity of every future bearing shoot, about an inch beyond the last joint, and nail the shoot firmly directly below that joint. This operation, by stopping the sap, causes it to accumulate in the buds, and hastens the maturation of the wood. The sooner, indeed, the future bearers are thus stopped in their growth, the better, but if done before this time, there is danger that the buds will prematurely burst.

16th. As the grapes will now be getting ripe, pretty generally, all watering must cease, both of the foliage and the border. A moist atmosphere is the most favourable to the growth of the berries, from the period of their setting, to that of making their last swell, after which, neither the atmosphere, nor the soil, can be well too dry.

30th. Examine the bunches frequently, for the purpose of cutting out injured and decayed berries, which, if suffered to remain, will quickly affect all the adjoining ones.

The fruit will now, most probably be attacked by birds and insects, if so, means must be used to protect it. If a few wide mouthed bottles containing sugared beer, be hung up in different parts of the vine, great numbers of wasps and flies will be enticed into them and destroyed. But if these insects be very numerous, this will only prove a partial protection. The bunches must be bagged, or the entire vine covered with bunting, or some other fabric of a similar description, and this will at the same time protect the fruit from the attacks of birds.

Oct. 21st. In gathering the fruit as it becomes ripe, it will be best to

choose, first, such bunches as hang within two feet of the ground, the berries on these being apt to rot, in consequence of the damp exhalations that now begin to rise from it; and, next, all such as are on the upper part of the wall above six feet from the ground, (if the wall reach that height,) these being exposed to the injurious effects of the wind; thus leaving to be gathered last, those bunches that hang from two to six feet from the bottom of the wall. If the wall have a projecting coping, the fruit on it will keep much longer than on a wall that is destitute of such a protection.

Nov. 4th. As long as any bunches of fruit remain, they must be examined every three or four days, and all decayed berries carefully cut out.

As soon as any shoots are divested of their fruit, they should be pruned immediately.

11th. *Fall of the Leaf.*—This interesting event takes place in general about this time. In well sheltered situations, some vines will retain their foliage to the end of this month, but in aspects that are exposed to the effects of the wind, the leaves are generally shed in the early part of it.

After the grapes have been deprived of the protection of the leaves, they begin to lose both weight and flavor; but if the aspect be favorable, and the wall have a projecting coping, they may be preserved in pretty good condition a fortnight or three weeks longer, after which, however, no reliance can be placed on the continuance of their flavour, although, in some instances, when the weather is very favourable, and great care is used in keeping the grapes dry, and in protecting them by proper coverings from the effects of severe frost, they may be kept on the vine in tolerable preservation till the beginning of January.—*A practical treatise on the cultivation of the Grape Vine on open walls.*

We have made copious extracts from this valuable treatise, with a view of putting our readers in possession of the outlines of Mr. Hoare's excellent method of cultivating the vine; but, in order to follow to advantage the practice recommended by Mr. Hoare, the work itself should be had recourse to, in which will be found ample details in connexion with the successful cultivation and management of THE VINE.

POMOLOGICAL NOTICES; OR, NOTICES OF NEW FRUITS WHICH HAVE BEEN PROVED, DURING THE PAST YEAR, TO DESERVE GENERAL CULTIVATION IN BRITISH GARDENS.

Our reliance for information on the subject of this article is principally on Mr. Robert Thompson of the Chiswick Garden, whom the committee of the London Horticultural Society has kindly permitted to supply us with information. The reasons why we depend so much upon him are, his extensive knowledge and experience, his enthusiasm for the subject, and his having all the fruits of Britain continually under his eye.

All the new fruits which are deserving of general cultivation will,

as Mr. Thompson observes, be found in the new edition of our *Encyclopædia of Gardening*, completed in one volume on the 1st of December last, 1834; we give from it Mr. Thompson's selections for small gardens. These may be confidently relied on, as by far the best selections that ever have been made for the cottager: for no man has the interest of this portion of his fellow-creatures more at heart. All the synonymes belonging to the following names will be found in the *Encyclopædia of Gardening*, or in the *Horticultural Society's Catalogue of Fruits*, 2nd edit. 1832.

APPLES.

"*For Cottage Gardens, where the Soil and Situation are favourable for the Production of the Apple, the following Sorts are recommended by Mr. Thompson*:—'Where the space will admit of only one tree, the best is the Ribston pippin; where two, the Ribston pippin and the Dutch mignonne; where three, the Wormsley pippin, Ribston pippin, and Dutch mignonne; where four, the Wormsley pippin, King of the pippins, Ribston pippin, and Dutch mignonne; where five, the Wormsley pippin, King of the pippins, Ribston pippin, Old nonpareil, and Downton nonpareil; where six, the Wormsley pippin, King of the pippins, Ribston pippin, Alfriston, Old nonpareil, and Downton nonpareil; where seven, the Wormsley pippin, King of the pippins, Ribston pippin, Alfriston, Dutch mignonne, Old nonpareil and Downton nonpareil; where eight, the Wormsley pippin, King of the pippins, Ribston pippin, Bedfordshire foundling, Court pendu plat, Alfriston, Brabant bellefleur, and Scarlet nonpareil or Downton nonpareil; where nine, the Wormsley pippin, King of the pippins, Ribston pippin, Bedfordshire foundling, Court pendu plat, Alfriston, Brabant bellefleur, Scarlet nonpareil, and Downton nonpareil; and where ten, to the preceding add Pennington's seedling.'

"*For training against Cottages, or Walls in Cottage Gardens.*—'It often happens, that one or more trees can be trained against a cottage wall or roof, or against some wall appertaining to a cottage; in these cases, the proper sorts are Ribston pippins, Old nonpareils, and, if a large kitchen apple be required, the Bedfordshire foundling.'

"*In Situations liable to Spring Frosts,* 'which so often kill the blossoms of the generality of apples, the Court pendu plat is recommendable, as its blossoms expand very late in the season.'

"*Under less favourable Circumstances,* 'where the Ribston pippin may not succeed, the Bedfordshire foundling will be a hardier substitute, or the King of the pippins, which is still hardier; the Northern greening may be planted for late kitchen use. For an autumn kitchen apple, perhaps, none, in this case, is more to be recommended than the Keswick codling. The Hawthornden comes into an abundant bearing state at an early age; and, were it not liable to die off in some soils, it might be preferred to the preceding.'

"*A wet Soil,* and a 'cold bleak situation, are what the cottager has the greatest difficulty in contending with; a poor soil he can enrich. In some instances it may be possible for him to remedy a wet soil by

drainage; but in other cases, he may find this beyond his means. He should, however, take care to plant the tree very shallow, or even place it entirely on the dug surface, and then cover the roots with the best mould he can collect. This he should afterwards keep mulched if the weather becomes very dry; but otherwise he should only keep the soil slightly stirred occasionally by a fork; or, if this cannot be done without injuring the roots, merely hoeing it will be better. In short, every thing should be attended to that will encourage the roots to run near the surface; the latter should, therefore, be trod upon as little as possible. Rotten manure should be applied; even leaves could be collected and applied in a state approaching to vegetable mould.' "

PEARS.

" *Sorts of Pears to be recommended where the Space is very limited; or for Cottage Gardens.*—Jargonelle, Marie Louise, Beurré de Capiaumont, Beurré Diel, Glout morceau, Easter Beurré, Beurré rance. These are all of first-rate excellence, deserving the protection of walls, where such can be afforded; but with the exception of the jargonelle, they are all hardy enough for standards, in any climate tolerably good as regards the growth of this class of fruits. It would be difficult to select fewer sorts than the above; because some might prefer a sort which would come fit for use in autumn, others in winter or spring. Several sorts may, however, be worked on the same tree, where the space will not admit of one of each being planted. For instance, the Beurré de Capiaumont is such a great and constant bearer (nothing to the contrary has been observed of it since it first began to bear in this country), that a whole tree would be more than sufficient for a small demand; it might, therefore, be partly worked with Glout morceau or Easter beurré. It may be farther remarked, that the Beurré Diel requires to have the branches kept rather thin, as otherwise its large and abundant foliage becomes too dense for the admission of sun and air to the fruit."

PEACHES.

In forming a small Collection of Peach Trees, for instance twenty-four trees of the very best sorts, and which will ripen their fruit in succession, the proportions, Mr. Thompson says, may be :—

" Early Anne 1, Gross mignonne 3, Royal George 2, Double montagne 2, Noblesse 2, Malta 1, Royal Charlotte 2, Bellegarde 4, Barrington 3, Late admirable 4. Should any of these, however, not agree with the soil and situation, or should more be required at any particular season, then the proportions may be varied, or some others introduced; such as the Acton Scot, Spring Grove, and Mountaineer, which may probably be found hardier. The best varieties for forcing are, the Bellegarde, Gross mignonne, Royal George, and Barrington."

NECTARINES.

" *For the chief supply of Nectarines*, none are so good as the Elruge and Violette hâtive. Hunt's tawny may be recommended as one considerably earlier than these; and, for a very late sort, one hitherto little known in this country, the Late yellow, deserves notice. In a

warm soil and favourable situation, the New white nectarine will produce fruit which will not only form a beautiful contrast in the dessert, but will likewise be esteemed for its flavour."

APRICOTS.

The best sorts are, the Red masculine, Large early, Royal, Moorpark, Breda, Orange (principally used in preserving), and Turkey. (*Encyc. of Gard.*, p. 918.)

PLUMS.

"*Selection of Sorts.*—The following are recommended by Mr. Thompson for a small garden:—Drap d'or, Green gage, Kirke's, Washington, Reine Claude violette, Coe's golden drop, Blue impèratrice, Coe's fine late red, Early Orleans, Shropshire damson, Diamond and White magnum bonum.

"*A still more limited Selection*, if required, may consist of the Green gage, Washington, Purple gage, Coe's golden drop, and Orleans.

"*The Sorts most deserving of Walls* are, the Green gage, Kirke's, Washington, Reine Claude violette, Coe's golden drop, and Blue impératrice."

CHERRIES.

"*Selected Lists.*—The following selected lists will be found suitable for different purposes and situations:—*For standards.* May duke, Royal duke, Late duke, Black eagle, Elton, Downton, Knight's early black, Black Tartarian, Morello, Kentish.—*For a south wall.* Early purple guigne, May duke, Knight's early black, Elton, Royal duke.—*For a north wall.* Morello.—*For an east or west wall.* May duke, Royal duke, Black Tartarian, Elton, Florence, Bigarreau.—*For preserving.* Kentish, Morello.—*The earliest cherries* are, Early purple guigne, Werder's early black heart, May duke, Knight's early black, Bowyer's early heart.—*The latest cherries* are, Late duke, Florence, Bigarreau tardif de Hildesheim, Morello."

GOOSEBERRIES.

The following deserve a place in every collection for table use:—*Reds*: Small dark rough red, Red champagne, Keen's seedling Warrington, and Red Warrington.—*Yellows*: Yellow champagne and Early sulphur.—*Greens*: Early green hairy, Glenton green, Pitmaston green gage (this fruit is deserving of particular notice; in some seasons it will hang till it shrivels, and almost candies on the tree); and Massey's heart of oak.—*Whites*: Taylor's bright Venus (of excellent flavour), Woodward's whitesmith, and Crystal. For early sorts, the Small dark rough red, Keen's seedling Warrington, Miss Bold, and Wilmot's early red; the Early sulphur; the Early green hairy and Green walnut; and the early white may be selected. For late sorts, the Red Warrington, Leigh's rifleman, Bury farmer's glory, and Farrow's roaring lion; the Late green; and Cook's white eagle. [Some of the best large sorts are:—*Reds*: Roaring lion, Top sawyer, Crown Bob, and Wonderful.—*Yellows*: Rumbullion, Piggott's leader, and Gunner.—*Greens*: Bumper and Peacock: *Whites*: Eagle and Ostrich.]

CURRANTS.

Black: The Black Naples is the largest and best; and next to that, the Black grape.—*Red*: The best are the Red Dutch, Knight's large red, Knight's sweet red, and Knight's early red. [Wilmot's new red, exhibited last summer, at one of the exhibitions of the Horticultural Society, is the largest-berried variety, we believe, known.]—*White*: The best is the White Dutch.

RASPBERRIES.

The best are: *Reds*: the Barnet, Antwerp, and Double bearing.—*Yellow*: The Yellow Antwerp.

STRAWBERRIES.

Scarlets:—Old scarlet, a shy bearer, but of high flavour, a great favourite with confectioners; Grove End scarlet, an abundant bearer, Roseberry, adapted for forcing; Gomstone scarlet, Black roseberry, American scarlet, and the Coul late scarlet, which does not ripen till all the others are nearly, if not quite, over.—*Blacks*: the Downton, excellent for preserving; and the Elton seedling, a great bearer, but ripening late.—*Pines*: Keens' seedling, the very best of all the sorts for general cultivation; the Old pine; Myatt's seedling, a shy bearer, but with a very high pine flavour; so much so, that when Keens' seedling is selling in Covent Garden market at 6d. a pottle, Myatt's seedling is selling at 3s. a pottle. It generally bears two crops a year, the second crop coming in about Lord Mayor's Day. In consequence of its flowering and bearing twice a year, the plants soon exhaust themselves, so that they cannot be depended on either for duration or a crop. Knevett's seedling, large, prolific, and very highly flavoured.—*Chile*: Wilmot's superb, very large.—*Hautbois*: Prolific, and Large flat.—*Green*: the Green pine.—*Alpines*: Red, White, Red wood, and White wood.

FILBERTS.

The red and white filberts, the Cosford nut, and the cob nut, are the best.

PINE-APPLES.

The Queen, Moscow queen, Black Jamaica, Brown sugar-loaf, Ripley, St. Vincent; Black Antigua (this should be cut as soon as it begins to turn yellow, or it will lose its richness); Enville, Lemon queen, White Providence, and Trinidad. This last is the largest grown, being reported to reach sometimes 26lbs.

VINES.

"*Vines to plant against a common Garden Wall of South Exposure, or against the Walls of a House.*—The early black, White muscadine, Grove End sweetwater, Pitmaston white cluster, White and Black sweetwater, Small and Large Black and White cluster, Black Esperione, &c.

To plant a Vinery for early forcing, take the preceding sorts; or Esperione, Black prince, Cambridge Botanic Garden grape, White muscadine, Royal muscadine, White sweetwater, White Frontignan, Grove End sweetwater, and Red Frontignan.

Some new varieties of grapes have lately been raised by Mr. Williams of Pitmaston, and the fruit exhibited and tasted at the meetings of the Horticultural Society, in October, 1834, which promises to be hardy and high-flavoured. Money's hardy muscat, or Eshcolata seems to deserve trial; and a very dark variety of black Hamburgh, in the Lewisham Nursery, produces fruit, which, on account of its colour, sells at 6d. a pound more than the common Hamburgh. We expect soon to be able to announce a very superior variety of winter grape, as introduced from Belgium.

FIGS.

" *Lindley's Selection* for a small garden in the southern and midland counties of England is as follows :—Black Ischia, Brown Turkey, Brunswick, Chestnut, Malta, Pregussata, Large white Genoa, Marseilles, Nerii, Small early white."

It is proper to observe, that, in the Horticultural Society's garden, little or no experience has as yet been obtained on the subject of grapes or figs; and that our selections of these fruits are the joint result of Mr. Thompson's recommendation and our own observation.—*Extracted from the Gardener's Magazine*, vol. xi., 1835.

NOTICES OF NEW CULINARY VEGETABLES.

The Cabbage tribe.—The early Dwarf Russian cabbage is recommended by Mr. Gordon, as preferable to all the other earlies. The Dwarf Portugal cabbage he strongly recommends as an article of luxury. *The new Russian Dwarf Broccoli* is said to be one of the best sorts.

Peas.—Knight's new green tall marrow, Knight's green marrow, and the Early Warwick, are very strongly recommended.

The D'Auvergne Pea, synonyme *D'Auverigny,* is an excellent pea. It was sent to the Horticultural Society from M. Vilmorin, of Paris, and is described in the *Bon Jardinier* for 1832, p. 269., as being new, very productive, and excellent. It is also described in the *Hort. Trans.* 2d series, published January, 1834. Vilmorin's sugar pea is also described in the same volume of the *Hort. Trans.* as deserving cultivation.—*G. Gordon. Chiswick Garden, Dec.* 12, 1834.

Kidneybeans.—The Painted Lady runner has a beautiful scarlet and white blossom, is very prolific, and does not grow so tall as the common scarlet runner. The scarlet-blossomed long pod, is an improved variety.

Carrots.—The purple-skinned and the white-skinned varieties, are novelties; but, as it appears to us, more of curiosity than value.

Turnips.—The following three sorts are of excellent quality, and nearly, if not quite, new to English gardens :—*Navet blanc plat hatif.* This is a small flat white turnip, of excellent quality, which comes into use a week earlier than the early Dutch. *Navet rouge plat hatif.*— This is like the preceding in shape, but rather longer, and not so early

by a week; the part above ground is of a dull purplish colour. [The seeds of these sorts may be obtained from M. Vilmorin, Paris, by whom they were sent to the London Horticultural Society's garden.] *The Black Turnip* is a valuable summer and autumn variety; it is rather larger than the early Dutch, of a globular form, and very firm; with the outside skin dark brown, and the inside white. It is very hardy, and remains long in perfection. It was sent to the Horticultural Society's garden, by Messrs. Booth of Hamburgh.—*G. G.*

The Fortyfold Potato, originated by Mr. Taylor of Preston, is very prolific; and is said to be very mealy and good-tasted.

Radishes.—The Radis rose demi-longue is a very superior variety, lately received from Paris. It is of a fine bright scarlet colour, and is an intermediate sort, between the long and round rooted varieties. It is very handsome, very early, of excellent quality, and remains longer in perfection than any of the long-rooted kinds; it is well adapted for growing in frames.

Artichokes.—The green globe is much the best variety: it is of a light green colour, and looks handsomer on the table than any of the others. Mr. Gordon says, he has "found that running small pieces of lath, or splinters of any wood through the flower stems, within 4 inches of the flower or head, at right angles to the stem, and keeping the wound open, retards the opening of the flower, and makes the head nearly double the ordinary size. This is a German practice, and seems to operate, like ringing trees, by impeding the return of the sap, and so stagnating it in the head.

The Flanders Spinach, though it has been several years in the country, cannot be too generally introduced. In consequence of the largeness of the leaves, the plants require to stand at a foot apart every way, which greatly lessens the labour of thinning out, cleaning, and even gathering. The seeds may be placed in drills at a foot apart in the row, which will save seed, and lessen the trouble of sowing and thinning. The plant is, in short, as economical as it is superior in quality.

The Quinoa may be recommended for trial, as a spinach, and as an agricultural plant; some seeds of it may be procured from Mr. Charlwood, through the kindness of Mr. Lambert.

The Italian and the Kentucky Celery, are recommended as the best. —*Extracted from the Gardener's Magazine*, vol. xi. 1835.

ARBORICULTURE.

A HISTORY OF THE FOREIGN TREES AND SHRUBS INTRODUCED INTO BRITAIN IN THE NINETEENTH CENTURY.

BY J. C. LOUDON, ESQ.

Trees are not only, in appearance, the most striking and grand objects of the vegetable creation; but, in reality, they are those which contribute the most to human comfort and improvement. If cereal grasses and edible roots are essential for supplying food to sustain human existence, trees are not less so for supplying timber, without which, there could neither be the houses and furniture of civilised life, nor the machines of commerce and refinement. Man may live and be clothed in a savage, and even in a pastoral state, by herbaceous productions alone; but he cannot advance farther: he cannot till the ground, or build houses or ships; he cannot become an agriculturist, or a commercialist, without the use of trees.

Trees also supply an important part of the food of mankind in many countries; besides all the more delicate luxuries of the table, and the noblest of human drinks in every part of the globe. The fruit of the palms, and of other trees of tropical climates, are as essential to the natives of those countries, as the bread corns and the edible roots of the herbaceous plants of temperate climates are to us. Wine, cider, arrack, and other liquors, are the products of trees; as are also our more useful and exquisite fruits, the apple, pear, plum, peach, mango, mangosteen, and many others. Not to insist in detail on the various uses of trees, it may be sufficient to observe, that there is hardly an art or a manufacture, in which timber, or some other product of trees, is not, in one way or other, employed.

The use of trees in artificial plantations, in giving shelter or shade to lands exposed to high winds, or to a burning sun, and in improving the climate and general appearance of whole tracts of country; in forming avenues to public or private roads, and in ornamenting our parks and pleasure-grounds, are too well known to require to be enlarged on here.

Every one feels that trees are among the grandest and most ornamental objects of natural scenery: what would landscapes be without them? Where would be the charm of hills, plains, valleys, rocks, rivers, cascades, lakes, or islands, without the hanging wood, the widely extended forest, the open grove, the scattered groups, the varied clothing, the shade and intricacy, the contrast, and the variety of form and colour, conferred by trees and shrubs? A tree is a grand object in itself; its bold perpendicular elevation, and its commanding attitude, render it sublime; and this expression is greatly heightened by our knowledge of its age, stability, and duration. The characteristic beauties of the general forms of trees are as various as their species; and equally so are the beauty and variety of the ramifications of their branches, spray, buds, leaves, flowers, and fruit. The changes in the colour of the foliage of trees, at different seasons of the year, alone form a source of ever-varying beauty, and of perpetual enjoyment to the lovers of nature. What can be more interesting than to watch the developement of the buds of trees in spring, or the daily changes which take place in the colour of their foliage in autumn?

It is not to be wondered at, that trees should have excited the attention of mankind in all civilised countries, and that our accumulated experience respecting them should be considerable. The first characteristic instinct of civilized society is to improve the natural productions by which we are surrounded; and the next is, by commerce to appropriate and establish in our own country the productions of others, while we give our own productions in exchange; and thus, the tendency of all improvement seems to be the equalisation of enjoyment, as well as to its increase.

Notwithstanding the use, the grandeur, and the beauty of timber trees, it is a fact, that, compared with herbaceous vegetables, the number of species distributed over the globe is comparatively small. The palms, the banana, the pine-apple, and other plants, popularly or botanically considered as trees or shrubs, though some of them attain a great height and thickness, cannot be used as timber. Almost all the timber trees of the world, with the exception of the bamboo, belong to what botanists denominate the dicotyledonous division of vegetables; and, perhaps, there are not a thousand genera of this division on the face of the earth, which afford timber trees exceeding 30ft. in height. The greater part of these genera, supposing such a number to exist, must belong to warm climates; for in the temperate zones, and in the regions of warm countries rendered temperate by their elevation, the number of genera containing timber trees 30ft. in height, as far as hitherto discovered, does not amount to a hundred. The truth is, that

between the tropics the greater number of species are ligneous, while in the temperate regions there are comparatively few, and in the frozen zone scarcely any. It may naturally be expected, therefore, that, in the temperate regions, there should only be a few timber trees which are indigenous to each particular country. In Britain, for example, there are not above a dozen genera of trees, furnishing in all about thirty species, which attain a height exceeding 30 ft.; but there are other countries of similar climates over the world, which furnish other genera and species, to what is, at present, an unknown extent; and it is the beautiful work of civilisation, of patriotism, and of adventure, first, to collect these all into our own country, and next, to distribute them into others. While Britain, therefore, not only enjoys the trees of the rest of Europe, of North America, of the mountains of South America, of India, and of China, she distributes her own trees, and those which she has appropriated, to each of these countries respectively, and, in short, to all parts of the world; thus contributing almost imperceptibly, but yet most powerfully, to the progress and equalisation of civilisation and of happiness.

During that portion of the nineteenth century which has now (1835) elapsed, the taste for foreign trees and shrubs has considerably increased among planters; and the number of new species and varieties that have been introduced, is proportionately greater than at any former period. Botanic gardens and arboretums have also become more general, and the variety introduced into shrubberies and ornamental plantations, though still not so great as it might be, bears some relation to the general improvement. The establishment of the Horticultural Society of London in the early part of the century, has had a material influence in spreading a taste for every department of gardening, not only in Britain, but throughout the civilised world. The interest, however, which belongs to this century, is greatly diminished to the present generation of readers, from the circumstance of the greater part of it being within their recollection. For this reason we shall limit ourselves to giving a short comparative view of the species of trees and shrubs which have been introduced, and a slight notice of the principal arboretums which have been formed; taking, as our authority for the date of the introduction of the trees and shrubs, our *Hortus Britannicus*.

In the first decade of the nineteenth century, viz., from 1801 to 1810 inclusive, ninety-four trees and shrubs were introduced: eight by Conrad Loddiges; six by Messrs. Lee and Kennedy; three by Fraser; nineteen by Lyon; one by the Kew Garden; one by the London Horticultural Society; one by Don of the Cambridge Botanic Garden; and one by Sir Abraham Hume. Among the most interesting articles introduced during this decade are, *R*ósa multiflóra, Cunninghám*ia* lanceoláta, Juníperus excélsa, *C*aprifólium japónicum, *R*osa Bánks*iæ*, *R*hododéndron catawbiéuse (by Fraser), and *C*ratæ'gus Aronia. It is somewhat remarkable, that of such a number of species introduced during this decade, the names of so few of the introducers should be

known, but it must be recollected that the means of introducing were, at this period, principally by packets of seeds sent to the nurserymen by foreign correspondents, or by amateurs; and that, as several years must necessarily elapse between the period of introduction, and that of flowering and naming, the name of the collector who sent the seeds, or of the nurseryman who first raised plants from them, is forgotten, or ceases to be of the same interest. The case is different when living plants are brought into the country, and it is, in truth, chiefly of the introducers of such that the names are known.

From 1811 to 1820, three hundred and seventy-four trees and shrubs were introduced, viz., forty-four by Messrs. Loddiges; twelve by Lyon; four by Lee and Kennedy; three by Whitley and Co. (among which was *Spiræ'a* bélla in 1820); three by the Horticultural Society (including Cotoneáster affínis in 1820); two by Fraser (*A*'bies Fráseri, and *Yucca* angustifólia in 1811); one by Don of the Cambridge Botanic Garden; one (the Ríbes sanguíneum, in 1817) by Archibald Menzies, Esq., who sailed round the world with Captain Vancouver; *Genísta* procúmbens by Schleicher, a botanical collector in Switzerland; one by Knight of the Exotic Nursery, King's Road; and one (Mahón*ia* fasciculáris) by A. B. Lambert, Esq. Among the most valuable of the species introduced by Loddiges are, Azálea arboréscens, A. speciósa, and Ribes aúreum, in 1812; Symphória racemósa, Cytisus ruthénicus, Juníperus recúrva, and Yucca tenuiflóra, in 1817; *A*'lnus cordifólia (the most beautiful species of the genus), in 1818; *A*rmeníaca brigantíaca, and Quércus stelláta, in 1819; Cratægus melanocárpa, *C.* latifólia, *C.* Olivier*iana*, *F*ráxinus pannósa, *F.* platycárpa, *F.* láncea, *P*inus excélsa, and *A*'bies *Pichta*, in 1820. Among those introduced by Lyon are, Magnól*ia* pyramidáta, in 1811; and Andrómed*a* floribúnda, Nyss*a* cándicans, Bóry*a l*igústrina, B. porulósa, B. acumináta, Virgíli*a* lútea, and *C*ratægus *a*piifólia, in 1812. Among the fine plants recorded as having been introduced in this decade, without mentioning the names of the introducers, are, *Æ*'sculus glábra and pállida, and Páv*ia*, hybrida in 1812; *Berberis* sinénsis, Cydónia japónica, and *D*áphne *T*hymelæa, in 1815; Plánera Richárd*i* in 1816; Cratægus *p*runifólia, in 1818; *Yucca* glaucéscens, *Ribes* caucàsicum, and *Caragana* microphylla, in 1819; *P*yrus napalénsis, *P*hiladélphus hirsútus, *P*ópulus macrophylla, *T*ilia laxiflóra, *P*inus adúnca, and *P.* uncináta, in 1820.

From 1821 to 1830, three hundred and eighteen trees and shrubs were introduced; viz., upwards of sixty by the Horticultural Society; twenty-five by Schleicher (obscure species of willows); twenty-one by Messrs. Loddiges; four by Lord Carnarvon; three by Whitley; one by Malcolm; one by Shepherd of Liverpool; one by Don of Cambridge; one by Low of Clapton; one by Philip Barker Webb, Esq., one (Benthàm*ia* fragífera, in 1825) by J. H. Tremayne, Esq.; one by the late Mr. William Baxter (Sóllya heterophylla, in 1830); one by Bunney; and one (Ribes speciosum, in 1829) by A. B. Lambert, Esq. By far the greater number of the species introduced by the Horticultural Society

were sent home by the late unfortunate Douglas, from the north-west coast of North America; among them are, Bérberis *A*quifolium, Gaulther*ia*, Shállon, *A*rctostáphylos tomentosa, Ribes viscosíssimum, and *A*cer macrophyllum, in 1826; and Bérberis glumacea, *A*cer circinatum, *A*rbutus procera, Ribes níveum, inebrians, and divaricatum; *R*ubus spectábilis *A*bies Douglas*ii*; *P*inus ponderosa, Lambert*iana*, and Sabin*iana*; Amelánchier flórida, and Gárry*a* ellíptica, in 1827. In this decade the Horticultural Society also introduced the *C*edrus Deodara from Nepal, in 1822; and Cotoneáster frígida, and C. Nummularia, in 1824. Among those by Loddiges are, Quércus Taúzin and Gledítsch*ia* cáspica, in 1822; *A*cer *o*pulifolium, *F*ráxinus álba, epíptera, fúsca, macrophylla, and quadrangularis, all in 1823; and *F*ráxinus cinerea and Cotoneáster microphylla, in 1825. The greatest number of the valuable trees and shrubs added to the British arboretum, during this century, was introduced by Messrs. Conrad Loddiges and Sons, and the next greatest number by the Horticultural Society. Messrs. Loddiges received their importations chiefly from their foreign correspondents, and more especially from American collectors and nurserymen. The principal British collectors during this period were, Fraser, Lyon, and Douglas. Notices of the first two have been kindly prepared for us by Mr. Forsyth; and of the latter we shall give a short abstract of a biographical memoir which appeared in the *Gard. Mag.* vol. x. p. 271.

John Fraser was a native of Inverness-shire; he came to London about 1770 (or 1776), married, and settled as a hosier and draper in Paradise Row, Chelsea; but, being of a very active and enterprising turn of mind, and having imbibed a taste for plants in his frequent visits to the physic garden at Chelsea, then under the care of the late Mr. Forsyth, he determined on proceeding to North America in search of new, rare, and interesting plants.

Accordingly, in 1783 or 1784, he embarked for Charleston, South Carolina, where he made his first collection of many valuable new plants, which he consigned for sale to the care of Mr. Frank Thoburn, nurseryman, at Old Brompton. In the beginning of 1785 he returned to London, and expected to receive the reward of his labours, but was told that all his valuable plants had died, and that those remaining were common, and not very saleable. This created a misunderstanding which led to a lawsuit, which was long and very expensive to both parties.

In the autumn of 1785 he again visited South Carolina, where he made acquaintance with a most valuable friend, Thomas Walter, Esq., an eminent botanist, who had compiled a *Flora Caroliniana*, which MS. Mr. Fraser brought to London, and which was published by him in 1788, 8vo. (the original herbarium of Mr. Walter is now in the possession of Mr. J. Fraser). In this second journey he was very successful in bringing home with him many new American plants, seeds, and dried specimens of plants, and various other objects of natural history. These were disposed of principally to the different plant collectors, nurserymen, and others, and he obtained liberal prices for them.

Among the plants were several species of pines, oaks, magnolias, azaleas, rhododendrons, &c.; all most valuable and ornamental trees and shrubs, hitherto unknown in the gardens of England. The *Hortus Kewensis* records 16 new plants as having been introduced by Mr. Fraser in 1786, and five more in 1787. He likewise brought home with him, for cultivation, the seeds of a new species of grass, then named *Agróstis* cornucopiæ (now Trichodium decúmbens), an account of which, with a coloured plate, he published in 1787 folio.

In 1790 and 1791 Mr. Fraser made his third and fourth voyages to America, where he extended his researches, and added further to his former collections. In 1791 he introduced the Thalia dealbata. About 1795 he established himself in a nursery, at Sloane Square, Chelsea, to which place all his subsequent consignments were made.

In April, 1796, he had completed his fifth voyage from America, bringing with him seeds and plants for sale as before. This year he visited Petersburgh, taking with him a choice collection of plants, which were purchased, and paid for most liberally, by the Empress Catherine. Upon his return to England, he introduced that fine fruit, the black Tartarian cherry, and also the white Tartarian cherry.

In 1797 and 1798 he repeated his visits to Russia, having been honoured with the commands of the imperial family to make further additions to their botanical collections; and, in the execution of these commands, he gave such satisfaction, that he was honoured, by special appointment, with the title of Botanical Collector to their Imperial Majesties the Emperor Paul and the Empress Marie, under the sign manual of each, dated Paulowskoe, August, 1798; and in furtherance of this commission he again, with his son John, in 1799, 1800, and 1801, visited the southern states of North America, the Isle of Cuba, the Bahamas, &c. In their passage to the Havannah, from the United States, they were shipwrecked, and saved themselves, with difficulty, in the Cayos, a small island at the entrance of the Old Channel. In Cuba they had the good fortune to meet with the celebrated travellers Baron von Humboldt and Aimé Bonpland, and from these generous men of science they received every assistance and kind recommendation to the authorities at the Havannah. After an absence of more than two years, Mr. Fraser returned to England with many new and valuable discoveries. (In 1800, the *Hortus Kewensis* records the introduction of thirteen new plants by the Frasers, and in 1801 two more, Andrómeda *cassinifolia* and Magnolia cordata.) He again went to Russia, but, in consequence of the sudden termination of the life of the Emperor Paul, he was unsuccessful, as his services were neither acknowledged nor requited by the Emperor Alexander. He made two visits afterwards to the capital of Russia, and to Moscow, in a fruitless attempt to obtain a just remuneration for his arduous and perilous employment.

In the vicinity of Matanzas, in Cuba, they discovered a beautiful species of palm, with silvered leaves (Córypha miraguama *Humb. et Bon.*, Nov. Gen. 1. p. 290.), the leaves of which produce a most beautiful and durable material for the manufacture of ladies' hats and bonnets. These

were woven by the hand, all in one piece, without sewing, in a new and peculiar manner: a patent was taken out for making them, and the manufacture was patronized by Her Majesty the late Queen Charlotte, and conducted under the management of his sister, Mrs. Christiana Fraser, through whose great perseverance in teaching many young persons the secret of the work, employment was afforded to a number of hands. Subsequently the manufactory proved unsuccessful, from want of capital, more than any other cause.

In 1806, 1807, 1808, 1809, Mr. Fraser made his last excursions to North America, in company with his eldest son. (The *Hortus Kewensis* records nine new plants introduced by them in 1809.) After this, he remained at his nursery in Sloane Square, carrying on the business there, in which, however, he was not successful. Here frequent disappointments, ill-treatment, and other circumstances, all tended to break down one of the most enterprising, indefatigable, and persevering men that ever embarked in the cause of botany and natural science.

He died at Sloane Square, April 26, 1811, in his 60th year, leaving his wife, who died a few years afterwards, and two sons; John, the eldest, who had been his companion in all his latter voyages to America and Russia, and who is now a respectable nurseryman at Ramsgate, and James Thomas, also living.

Of John Lyon, another botanical collector, very little is known. He is said to have been a natural son of William Lyon, Esq., of Gillogie, Forfarshire, who was afterwards a merchant in London. When he went to America is uncertain; Pursh, who had the management of the gardens of William Hamilton, Esq., at Woodlands, near Philadelphia, informs us that, when he resigned, in 1802, Lyon succeeded him, and remained there till 1805.

During this period Lyon, we are told by the Messrs. Loddiges, sent home several plants and seeds; and the year after he left Mr. Hamilton's service (1806), he brought an extensive collection to England; the plants composing which were partly disposed of by private contract, but were chiefly sold by auction in a garden at Parsons' Green, Fulham. The catalogue of these plants fills 34 closely printed pages, it enumerates 550 lots, and the sale occupied four days. Several of the lots were composed of large quantities of one-year-old seedlings in pots; and ten lots at the end of the sale consisted each of 50 different sorts of seeds. This, it is believed, was by far the greatest collection of American trees and shrubs ever brought to England at one time, by one individual. It contained scarcely any herbaceous plants; and the trees and shrubs were chiefly such as had been already introduced. In the *Hortus Kewensis* fourteen new plants are mentioned as having been introduced by Lyon in 1806, which, doubtless, formed part of the importation of that year.

Mr. Lyon appears to have soon after gone out again, and explored the southern states of North America; viz., the Carolinas, Georgia, and Florida; and, in 1811 and 1812, he again brought over a large col-

lection of plants in cases, which arrived in very fine condition, and were disposed of by public auction at Chelsea. Six plants are mentioned in the *Hortus Kewensis* as having been introduced by Lyon during these years.

Mr. Nuttall separated some of the species of Andrómeda, and formed of them a new genus, which he named Lyonia, "To commemorate the name of the late Mr. John Lyon, an indefatigable collector of North American plants, who fell a victim to a dangerous epidemic amidst those savage and romantic mountains which had so often been the theatre of his labours." (*Gen. of N. American Plants*, Boston, 8vo, 1820, 1. p 266.) The genus was, however, named before Mr. Lyon's death, as appears by the catalogue, before referred to, of plants sold in 1806, in which several species of Lyonia are mentioned. Mr. Lyon, it is believed, died in 1818.

David Douglas was born at Scone, near Perth, and served his apprenticeship, as a gardener, in the gardens of the Earl of Mansfield. About the year 1817 he removed to Valleyfield, the seat of Sir Robert Preston, Bart., then celebrated for a choice collection of exotics, and shortly afterwards went to the Botanic Garden of Glasgow. Here his fondness for plants attracted the notice of Dr. Hooker, the professor of botany, whom he accompanied in his excursions through the Western Highlands, and assisted in collecting materials for the *Flora Scotica*, with which Dr. Hooker was then engaged. This gentleman recommended him to the late secretary of the Horticultural Society, Joseph Sabine, Esq., as a botanical collector; and in 1823 he was dispatched to the United States, where he procured many fine plants, and greatly increased the Society's collection of fruit trees. He returned in the autumn of the same year; and in 1824 an opportunity having offered, through the Hudson's Bay Company, of sending him to explore the botanical riches of the country adjoining the Columbia river, and southwards towards California, he sailed in July for the purpose of prosecuting this mission.

While the vessel touched at Rio de Janeiro, he collected many rare orchideous plants and bulbs. Among the latter was a new species of Gesneria, which Mr. Sabine named, in honour of its discoverer, G. Douglasii. He was enraptured with the rich vegetation of a tropical country; he stopped at Rio longer than he anticipated, and left it with regret. In the course of his voyage round Cape Horn he shot many curious birds peculiar to the southern hemisphere, and prepared them for sending home. On Christmas-day he reached the celebrated island of Juan Fernandez, which he describes as "an enchanting spot, very fertile, and delightfully wooded. I sowed a large collection of garden seeds, and expressed a wish they might prosper, and add to the comfort of some future Robinson Crusoe, should one appear." He arrived at Fort Vancouver, on the Columbia, on the 7th of April, 1825. Here an extensive field presented itself to him; and the excellent manner in which he performed his duty to the Horticultural Society cannot be better exemplified than by referring to the vast collections of seeds

which from time to time he transmitted home, along with dried specimens, beautifully preserved, and now forming part of the herbarium in the garden of the Society at Chiswick. Of the genus *Pinus* he discovered several species, some of which attain to an enormous size. The *Pinus Lambertiana*, which he named in compliment to Aylmer Bourke Lambert, Esq., vice-president of the Linnæan Society, is, perhaps, the largest of the whole. One of these, which had been blown down, measured 215 ft. in length, and 57 ft. 9 in. in circumference, at 3 ft. from the ground. The cones of it, which Mr. Douglas sent home, were 16 in. long, and 11 in. in circumference. The kernel of the seed is sweet and pleasant to the taste, and is eaten by the Indians, either roasted, or pounded into coarse cakes for winter store. The resin, which exudes from the trees when they are partly burned, loses its usual flavour, and acquires a sweet taste; in which state it is used by the natives as sugar. Another species, named by Mr. Sabine *Abies Douglasii*, attains nearly the size of the above.

In the spring of 1827 Mr. Douglas traversed the country from Fort Vancouver, across the Rocky Mountains, to Hudson's Bay, where he met Captain (now Sir) John Franklin, Dr. Richardson, and Captain Back, returning from their second overland arctic expedition. With these gentlemen he came to England in the autumn, bringing with him a variety of seeds, as well as specimens of plants and other objects of natural history. Through the kindness of his friend and patron Mr. Sabine, he was introduced to the notice of many of the leading literary and scientific characters in London; and shortly afterwards he was honoured by being elected, free of expense, a Fellow of the Linnæan, Geological, and Zoological Societies; to each of which he contributed several papers, since published in their *Transactions*, evincing much research and acuteness as a naturalist. Some entertaining extracts from his letters to Dr. Hooker were published in *Brewster's Edinburgh Journal* for January, 1827; and a genus of plants belonging to the natural order Primulaceæ was dedicated to him by Professor Lindley, and defined in *Brande's Journal* for January 1828.

After being in London for two years, Mr. Douglas again sailed for Columbia in the autumn of 1829; where he remained some time, enjoying his favourite pursuit, and adding largely to his former discoveries. His return was expected by the very ship which brought the tidings of his horrible death; an event which was occasioned by his falling into a pit made by the natives of the Sandwich Islands for catching wild bulls, one of the latter being in at the time.

The plants introduced by Mr. Douglas are supposed to be more numerous than those introduced by any other individual whatever; and what greatly adds to their value is, that, being from a temperate region, they will all endure the open air in this country. The number of herbaceous species which he introduced amounts to nearly 100, and of trees and shrubs to 50. The names of the latter compose the following list, which has been kindly communicated to us by Mr. Munro, the head gardener of the London Horticultural Society.

In 1826 and 1827.
*A*bies Douglasii.
*A*cer circinatum.
macrophyllum.
Amelánchier flórida.
parvifolia.
*A*rbutus procera.
Arctostáphylos tomentosa.
Bérberis Aquifolium.
glumacea.
Caprifolium ciliosum.
Douglasii.
hispidulum.
Carya nigro-cathártica.
* *Ceanothus* collinus.
*ellipticus.
Gárrya elliptica.
Gaultheria Shállon.
* *Laúrus* occidentalis.
Pinus Lambertiana.
ponderosa.
Púrshia tridentata.
Ribes viscosissimum.
aúreum.
cereum.
divaricatum.
echinatum.
irríguum.
Ribes lacústre.
Ribes níveum.
petiolare.
sanguíneum.
Rubus nutkanus.
spectábilis.
Sálvia carnosa [Audibértia incana.]
Spiræa ariæfolia.
*V*accínium ovatum.
In 1831.
*A*bies amábilis.
grándis.
Menziesii.
nóbilis.
Clématis Douglásii.
Pinus monticola.
mont. var. with red cones.
Sabiniana.
Pyrus rivularis.
Ribes glutinosum.
malvaceum.
speciosum.
In 1832.
Lupinus álbifrons.
Pinus Sabiniana var.
In 1833.
Pinus insígnis.

Of the above specimens, which were all introduced by seeds, the three marked with a * did not vegetate. Some species of *Rosa* and *Cratægus*, not included in the above list, have vegetated, but are not enumerated, as they have not yet flowered; and consequently have not yet been named or identified.

To enable our readers to take a general view of the various details respecting introductions given in the preceding pages, we shall next endeavour to generalise them; first numerically; and, secondly, geographically. For the first object, we have had from our *Hortus Britannicus* an enumeration made of the number of species introduced in each decade, from the beginning of the 16th century to the end of the year 1830. We do not give this enumeration as perfectly accurate; because many of the species in our catalogue, as in every other, are doubtful; but it is not of much consequence whether it be perfectly accurate or not; it is sufficiently so to show the ratio of the increase of the introductions, from the earliest periods of which we have any record of them, up to the present time.

There were introduced from the year	to the year	Species.	There were introduced from the year	to the year	Species.
1548	1550	17	1691	1700	24
1551	1560	1	1700	1710	12
1561	1570	18	1711	1720	12
1571	1580	3	1721	1730	44
1581	1590	2	1731	1740	69
1591	1600	48	1741	1750	21
1601	1610	1	1751	1760	77
1611	1620	1	1761	1770	58
1621	1630	22	1771	1780	58
1631	1640	27	1781	1790	49
1641	1650	4	1791	1800	45
1651	1660	17	1801	1810	93
1661	1670	7	1811	1820	364
1671	1680	1	1821	1830	242
1681	1690	27			

The numbers, taken by centuries, are, in the 16th century, 89; in the 17th, 131; in the 18th, 445; and, in the first three decades of the 19th, 699! The total number of foreign trees and shrubs introduced up to the year 1830, appears to be about 1300; or, probably, up to the present moment, including all those species which have not yet flowered, and, consequently, have not yet been recorded in books, about 1400.

The countries from which these 1300 species have been introduced appear, from the *Hortus Britannicus*, to be as under:—

Europe: Greece, Turkey in Europe, and the Levant, 36; Italy, 35; Sicily and other Mediterranean Islands, 19; Spain, 69; Portugal, 12; Switzerland, 49; France, 34; Germany, 52; Hungary, 46; Russia, 41; Sweden, 4; Lapland, 4; Spitzbergen, 1; North of Europe, 2; Central Europe, 18; South of Europe, 111: in all, 543. *Asia*: Siberia, 69; Asia Minor, 3; East Indies, 4; Nepal, 54; China, 34; Japan, 11; Persia, 5; Asia, 3: in all, 183. *Africa and the Canary Isles*: Barbary States, 13; Egypt, 3; Cape of Good Hope, 4; Canary Isles, 3: in all, 23. *America*: North America, 528; Mexico, 4; South America, 22; Straits of Magellan, 6: in all, 560. *Australia and Polynesia*: New Holland, 1; Van Diemen's Land, 2; New Zealand, 1: in all, 4.

It would thus appear, that nearly half the foreign trees and shrubs in the country have been introduced during the present century; and that these have been brought chiefly from North America. Among them there are not more than 300 trees which attain a timber-like size, and of these by far the most valuable is the larch. Some of the European acers, the sweet chestnut, some oaks, some poplars, pines, and firs, and the platanus and cedar from Asia, are also valuable as timber trees; but the chief accessions to this class are the acers, oaks, elms, ashes, poplars, birches, pines, and firs of North America. Our principal fruit trees are from Asia, including the common walnut, which is both a fruit and a timber tree; but by far the finest ornamental trees and

shrubs are from North America. Our greatest hopes for future introductions are from the unpenetrated regions of North America, and the mountainous regions of Asia and New Zealand.—*Loudon's Arboretum Britannicum.*

NOTICES OF NEW HARDY TREES AND SHRUBS, DESERVING OF GENERAL CULTIVATION IN USEFUL OR ORNAENTAL PLANTATIONS.

Among the trees which we would recommend as worthy of introduction every where are, the scarlet-flowered horsechestnut, the new scarlet-flowered thorn, the *C*ratægus tanacetifolia, Aronia, and odoratíssima, remarkable for their large yellow or coral-coloured fruits; the *S*órbus doméstica, and the *D*iospyros virginiana, both of which have borne fruit freely, on trees only ten years planted in our garden at Bayswater, this last summer; the *P*yrus vestita, the noblest tree of the genus, of which there is a fine stock of plants at Messrs. Loddiges's; the Nyss*æ*, all the species of which are beautiful small trees; the *A*'lnus cordata, and the cut-leaved alder; the cut-leaved birch; the scarlet oak; the new Lucombe oak; the new variegated evergeen oak, introduced by Mr. Veitch; the liquidambar, an old inhabitant of the nurseries, but a tree which ought to be in the margin of every plantation whatever, whether useful or ornamental; the *P*inus *C*émbra and Sabin*iana* the *A*'bies Douglas*ii*, a rapid-growing tree: the *A*'bies Webb*iana*, a kind of giant silver fir; and, in short, all the new species of *P*inus and *A*'bies that can be got. If our nurserymen were skilful in grafting these genera, in the herbaceous manner practised extensively by the French, and nowhere with more success than in the Fromont Nursery, we should have no want of young plants of all the rare pines and firs; of many of which, there is at present hardly a plant to be got. That such grafted pines and firs will ultimately become large timber trees, is proved by the size which such grafted trees have attained in the arboretum of the Botanic Garden at Metz, as seen by us in 1828, and noticed in the *Gardener's Magazine for* 1829.

It may seem superfluous to recommend the cedar of Lebanon; yet we cannot help reminding planters that this noble tree will, under the same circumstances, grow as rapidly as the common larch. Mr. Sang of Kirkaldy published this many years ago; and it may be proved at Kenwood, Lady Tankerville's at Walton, Claremont, Ascot Park, High Clere, and a number of other places, all mentioned in the Gardener's Magazine; and is farther confirmed by the Return Papers which have been filled up for us from all parts of the country.

Among the new shrubs we would strongly recommend that beautiful evergreen Escallon*ia* rubra; and, where there is a conservatory wall, we would recommend also the Escallon*ia* montevidénsis.—*Gardener's Magazine,* vol. XI.

FLORICULTURE.

THE PROGRESS OF FLORICULTURE.

Floriculture apart from botany is rapidly gaining ground, and among those who encourage, by example as well as principle, we are right glad to find the clergy. As a recreation it is perhaps one of the most innocent, and as it gradually rivets the attention of every body who enters upon its study and practice, there is a probability that it will in time wean many a thoughtless man from thoughtless habits, and elevate his mind above other kinds of pleasure less congenial to health, morality, and religion. There is nothing in the theory or practice of floriculture which is inconsistent with the most complete and exemplary life. We are no puritans, but we can observe the difference between good and bad habits. We are not half so serious as we ought to be, but we can take delight in seeing men profit in mind while they are relaxing from labour, and we know of nothing which affords a finer opportunity than the cultivation of flowers. Floriculture has one advantage which many other sciences have not; the most ignorant may follow it, and that too on equal terms with the most learned; all can understand the beauties of a florist's flower, it derives not its value or importance from the distance it comes; the place of its nativity has nothing to do with the estimation in which it is held. The new variety raised by a ploughboy is worth as much and will bring as much as an equally good flower raised by a prince, and the man who could never read in his life may be just as good a judge as a professor of botany. There is as much perseverance, too, among the lowly cultivators of fancy flowers as among those whose means are unlimited, and frequently much more; where the cottager, or the mechanic, once takes to his garden, that is the place to find him in all seasons of relaxation; his leisure hours if he were not there could not be spent better, and might not be spent so well.

The showing of flowers for prizes is one of the means by which the perseverance of the grower is encouraged, and success on such occasions one of the means by which his labour is sweetened, and his love

of flowers increased; there is nothing like emulation—to create this is the grand secret of making labour sweet: the man who in his ordinary occupation would feel miserable with a wet foot, has been known to stand knee deep in water to catch a trout, or walk for hours in wet grass to shoot a partridge. In the one case inconvenience is uppermost, because there is no exercise of the mind, and a man has nothing to do but feel; in the other the body is completely subservient to the grand object in view: heat, cold, wet, or fatigue, are alike unimportant while an object which engrosses the attention directs the steps.

How many will be found who labour for their own pleasures, but who would think a fourth of the exertion a trouble in the absence of a motive, or if enforced by others. Boating, cricketing, hunting, shooting, angling, would be so many modes of annoying men if they were forced by a superior power, instead of led by their own inclination to voluntary toil; and as man looks for relaxation in some sport, or fancy, or occupation, unlike his usual labour or pursuit, happy must it be for the family of that man who finds all he requires in the garden. Well may the clergy take an interest in the welfare of floriculture, for they can forward their own missions by encouraging it among their neighbours. He who cultivates flowers has the wonders of creation perpetually before his eyes or under his notice, his avocation is sweetened by the variety and beauty of the productions he delights in. Benevolence itself approves the pursuit which tortures no living thing, which improves the health, calms the passions, sweetens labour, and affords an inexhaustible store of pleasure, without injuring a human being, or harming an animal. It is this which places floriculture above all other sources of pleasure; it is this which makes it a favourite science among the most pious of the clergy; it is this which, when the nobility and the wealthy in general once see its importance, will make them voluntarily support societies for its encouragement from one end of the kingdom to the other.—*Florist Register*, No. VI.

A DESCRIPTION AND THE CULTURE OF SOME OF THE MOST REMARKABLE STOVE PLANTS.

Amongst those plants which possess peculiar irritability or remarkable appendages, none are more interesting than the *Dionœa*, *Nepenthes*, *Sarracenia*, and others, which have the power of entrapping insects. Plants having this property may be divided into three sections. 1st, Those which have hollow vessels or appendages attached to either their leaves or branches, containing a liquid, into which the insect having entered, is unable to return, as in *Sarracenia*, *Nepenthes Cephalotus*, &c. 2nd, Those which entrap by their irritability, as *Dionœa*, &c.

First, Such as have hollow vessels or appendages attached either to their leaves or branches. The remarks made by Mr. Murphy, in the Horticultural Register, vol. i. p. 214, are as follow:—" During my

sojourn in the botanic garden of Trinity College, Dublin, where for some years I had the charge of the exotic plants, I took particular pleasure in availing myself of the excellent opportunity which I enjoyed, of subjecting to the test of experiment whatever I found recorded concerning the habits of the several plants; and especially with relation to the subject of this communication, being of opinion that much which is supposed to be known on this subject rests on little more than mere conjecture; and with a view to direct the attention of others to the elucidation of an interesting inquiry, I shall take the liberty of submitting to you the result of the observations which I was enabled to make.

"And first, with respect to the side-saddle flower, (*Sarracenia*), a genus of plants with which most gardeners are acquainted. Each leaf is a hollow cylinder, capable of containing water: the aperture at the extremity of the tube is furnished with a leafy appendage, which before the leaf reaches its full size covers it so closely as to exclude the rain and dews; at other times the lid recedes from the aperture, and then the tube will generally be found to contain water, in which a number of dead and dying flies may at all times be observed. This singular construction of the leaf is evidently designed by nature to retain moisture for the purpose of supplying the plant in times of drought; but the late Sir J. C. Smith, having probably examined the plant when young, and observing that the aperture of *S. adunca* (*variolaris*) was so completely closed as to exclude water, gave it as his opinion that the tube must have been intended to serve some other purpose; and having stated, on the authority of one of the young men in the Liverpool Botanic Garden, that the flies are deposited in the tubular leaves, by a species of sphex or ichneumon, concludes that 'The flies are deposited by this insect, unquestionably for the food of itself, or its progeny, probably depositing its eggs in their carcasses, as others of the same tribe lay their eggs in various caterpillars, which they sometimes after bury in the ground.' I cannot avoid observing, that this quotation betrays greater inaccuracy in the late venerated president of the Linnæan Society, than one would have supposed compatible with the known industry of that close observer, and ardent lover of nature. We are not acquainted with any species of sphex or ichneumon which, in its perfect state, feeds on dead flies; and to place the fly in which the ichneumon had deposited its eggs in a situation where it must at once cease to exist, would be to frustrate the end designed in laying them, and is contrary to every thing that is known of the habits of these insects; for although the caterpillars often fall victims to these parasites, it is not until the latter have lived for some time, and have reached that stage of existence when they assume one of their metamorphoses."

A leaf of *Sarracenia flava*, now before me, contains no less than thirteen flies, principally the blue-bottle fly (*Musca vomitoria*), with two or three of the common house-fly (*Musca domestica*). I have frequently observed the former of these species, after having penetrated

some distance into the tube, struggling in vain to extricate itself; but no sooner had I enabled it to escape, than it flew off with its wonted strength and activity. Now, supposing it possible that any species of the sphex or ichneumon, which are occasionally observed in hot-houses, should possess the strength necessary to compel the common house-fly to enter the tube, contrary to its inclination, it is far beyond the reach of probability to imagine that it could oblige the blue-bottle to do so; and however easy it may be for the ichneumon to deposit its eggs in the sluggish caterpillar, it could by no means deposit them in the body of this strong and restless insect. But, if the flies are not deposited in the tubes of this plant by these insects, what is it that induces them to enter? Possibly, as suggested in Kirby and Spence's "Introduction to Entomology," the effluvia emanating from putrid animalculæ, in the lower part of the tube, may induce the flies to enter in search of a fitting receptacle on which to deposit their eggs, or they may enter in quest of food; but whatever be their inducement, repeated observation has convinced me that their ingress is voluntary; and having descended some length, the gradual contraction of the tube, assisted by short stiff hairs which clothe its inner surface, and which point downwards, effectually prevent their return.

These observations render it unnecessary for us to say much more relative to the *Sarracenia*. We might just add, however, that some pitchers which we examined the other day, on plants in our possession, contain flies of a large size, which must have crawled down of their own accord, since, from their position on the sides, not having reached the bottom, it was evident that they were walking down, and could not have been violently thrown in by any other insect. We also saw a large wood-louse (*oniscus*) which had not reached the bottom. May not these have been allured by the sweetness found on the edge of the pitcher? particularly on that part of the *S. adunca?* This seems to have been the opinion of Macbride; the water, however, at bottom is often very offensive, which no doubt arises either from the putrid insects, or stagnation, or both, as we could not perceive any smell in those just opened, where no insects had made an entrance, and the water was fresh, nor had it any unpleasant taste.

Culture of Sarracenia.—The usual mode of culture practised at Chatsworth is to plant them in pots filled with turfy peat, mixed with small pieces of freestone to keep the soil very open; the pots are then plunged in sphagnum, or placed in pans of water. During the summer months they stand in a frame placed on a north border, and in winter we keep them in the greenhouse. *S. variolaris* has, however, grown luxuriantly in an airy corner of the stove, planted in sphagnum alone.

The goblet-shaped appendages attached to the leaves of the *Nepenthes distillatoria*, are like so many organs of secretion, for it is plain the plant supplies the water they contain through the footstalks. These plants grow in China, and the marshes of India, in situations where they are partially submerged in water. Each pitcher has a curious lid,

which is at first shut closely down; but as the pitcher grows in size, the lids gradually open, and they are then found to contain a considerable quantity of water, which has something of a sweetish, though rather insipid, taste. Within a few days after the lids open, the pitchers become the grave of a multitude of insects, chiefly flies, concerning which a variety of opinions have been entertained. The uses of the pitchers are scarcely known. Rumphius supposed they were intended as nests for a sort of shrimp frequently found therein. Linnæus thought they were reservoirs of water, to which animals might repair in time of drought, their lid being especially destined to close up the mouth of the vessel for the prevention of evaporation. Others suppose the putrid insects form a kind of animal manure, which passing through the footstalk of the leaf, nourishes the whole plant. It is difficult to determine what may be their use; but they can scarcely be considered mere reservoirs of water for animals, since the plants invariably grow in swamps and ditches where such reservoirs would be useless. Besides, the lid never alters its position when once raised from the pitcher, and therefore does not prevent evaporation, the mouth being once opened. The water contained in the pitcher is, for the most part, evaporated within a few days after the opening of the lid, although there is evidently an increased secretion during the nights yet never to any considerable quantity, at least not in our stoves. Professor L. C. Treviranus, of Breslaw, found that when the lid of *N. phyllamorphia* was open, the water diminished one half by solar evaporation, but it was restored again at night. In Ceylon, Mr. Campbell informs us that animals of the Simia tribe are well acquainted with this plant, and frequently resort to it to quench their thirst: still we can scarcely suppose this to be their destined use, for many other trees bear similar appendages, which could not be readily, if at all, emptied. Besides, the situation in which some of them grow, would render such a providential provision unnecessary. Whatever be their uses, there can be no doubt but they are necessary to the welfare and growth of the plant; for if one be inadvertently injured, the leaf to which it was attached becomes sickly, and for the most part is incapable of performing its natural functions.

So great a quantity of spiral vessels was discovered by Mr. Valentine in the stem and petioles, that no plant has yet been noticed in which they are equally abundant. Now, Bischoff ascertained that the air conveyed by spiral vessels contains about 28 per cent. of oxygen; and, as an excessive supply of oxygen is destructive of vegetable life, it has been suggested that the pitchers are intended to rid the plant of its oxygen, and that the water they contain has been discharged by the spiral vessels themselves. An observation of the late Dr. Jack appears to favour this opinion; for on examining the pitchers, he found the bottoms beautifully punctured, as if by the mouths of vessels; the same we have noticed ourselves. Dr. Graham states, that the water contained in some of those which he examined at the Botanic Garden, Edinburgh, was at the first slightly acid, and that, as the water evapo-

rated, the acidity increased, until the whole had passed off. Dr. Turner analysed the water from an unopened pitcher, and found it to contain minute crystals of super-oxalate of potash; and he says, that during the time of boiling, it emitted an odour like baked apples, from its containing a trace of vegetable matter. This may be considered as most of what is at present known of the uses of the appendages of *Nepenthes*.

Culture of the Nepenthes.—Slight shade, heat, and moisture, are indispensable for the successful culture of *Nepenthes*. They thrive best if potted in chopped moss: when they are potted, plunge them in a bed of moss, made on the flue of the stove, or other situation where they can receive a good portion of bottom heat, yet not too violent. In such a situation, they will thrive wonderfully, if the moss in which they are plunged be kept constantly moist, and the plants be syringed every day with tepid water, and the powerful rays of the sun be broken by the shadow of some other plants. One in a similar situation at Chatsworth is upwards of four feet high, and bears pitchers of a very large size.

The next plant in order is the *Cephalotus follicularis*, or New Holland Pitcher Plant. The root is a perennial belonging to the natural order *Rosaceæ*, according to Dr. Hooker, although Dr. Lindley places it doubtfully under *Sanguisorbeæ*, in his "Introduction to the Natural System." This plant is remarkable for the presence of flat leaves of an elliptical form amongst the pitchers. The form of these last are ovate, of a green colour, tinged with purple, and beautifully fringed with hairs. The inside, which contains sweetish watery fluid, and entraps many insects, especially ants, is dark purple. The mouth is contracted, and crested with rings of dark purple. In regard to the organisation and position of its pitchers, the plant may be compared to the *Sarracenia*. M. Labillardiere discovered it in Leuin's Land, and figured and described it in his specimens of the plants of New Holland. Mr. Browne, during his voyage with Captain Flinders, detected it on nearly the same line of coast, viz. in the neighbourhood of King George's Sound.

Not being in possession of this plant, we are unable to speak from experience, and have copied from Dr. Hooker, in the Botanical Magazine, what is stated above, in which work it is beautifully figured, fol. 3119. Several trees and climbing plants have similar appendages attached to the leaves, but are entirely destitute of the lid. For instance, in the species of *Dischidia*, which are climbing plants, the pitchers are in the form of bags of a greenish colour, and hang in bunches from the slender stems; and the use of them, as Dr. Wallich remarks, is probably "to form reservoirs of nutriment from which the roots emitted by the stem, and constantly found ramifying within them, absorb food for the general support of the individual. In this case they are necessary, on account of their long, slender, twining stems being too narrow a channel of supply from the subterranean roots to the leaves." The *Macgraavia* also have little pitchers occupying the place of bracteæ, which either hang down or stand erect among the flowers, but, together

with the last, are very differently constructed from the *Nepenthes* and *Sarracenia*. Amongst these hollow-leaved plants may be placed the *Dipsacus fullonum*, which forms, at the axillæ of the leaves a kind of basin, usually containing a quantity of water, which becomes the grave of a multitude of insects. The water had once the reputation of being a beautifier of the skin, but is now little regarded.

The preceding remarks are chiefly confined to some of the plants having peculiar appendages, attached either to their leaves or some other part of the plants, into which, being hollow and containing a liquid, insects of different kinds are, from some unknown motive, induced to enter, and from which, on account of certain impediments, they are totally unable to escape; consequently, the hollow appendage becomes their grave: but whether their death is necessary to the well-being of the plant cannot be decided, and, therefore, the question must be for the most part left as we found it.

The next plants in order are those which have the power of entrapping insects by the contractility or irritability existing either in the leaf or flower. Amongst those possessing irritability in their leaves, none are more remarkable than the *Dionæa Muscipula*, or Venus's Fly-trap. This plant has jointed leaves, furnished on the edges with a row of strong prickles, and what is usually called the leaf is supposed by some to be the petiole, which is winged like that of the orange, so that it is the proper leaf which operates as the trap. Others, however, have thought that the winged petiole, or leaf-stalk, is the true leaf itself, and that the trap is merely an appendage; this latter opinion, from the appearance of the plant in our possession, strikes us as being the most probable. There is a sweetness secreted in glands on the surface of the trap, which appears to attract flies; and no sooner do they venture to settle on its surface, than the sides of the leaves spring up after the manner of a rat-trap, and locking their rows of prickles together, squeeze the insects to death; after which it again expands. Linnæus and others thought, that if the insect ceased to struggle, the leaf would open and liberate the prisoner. This might possibly be the case, if it were perfectly quiet, but the least irritation keeps it fast closed. Ellis says the lobes never open again, so long as the animal continues therein; that is, so long as it remains a perfect insect, or, in other words, until it becomes a skeleton. However correct this idea may be in some instances, it does not appear to hold good in all; for some plants of the kind in our possession begin to open soon after the little insect's death, and in the course of a short time the plant is expanded as it was before. A straw or a pin touching the middle of each lobe has the same effect as the legs of an insect, for the chief seat of irritability appears to be in three small hairs situated in the middle of each lobe; but after these are withdrawn, the lobes will again open in the course of an hour. What can be the use of this extraordinary irritability is not at present discovered. Sir J. E. Smith believed that the dead insects were beneficial to vegetation, and this opinion so far influenced Mr. Knight, of the King's-road, London, that he supplied the leaves of a plant with

fine filaments of beef, and from that treatment it grew more luxuriant than some others in his possession, which were not treated after that manner. This experiment goes far towards confirming the opinion that the dead insects are intended to supply the plant with animal manure. Dr. Barton, however, does not think it at all probable that either this plant, or others which grow in rich boggy soil, can need additional stimulus. There is no doubt some wise end is answered by so extraordinary an appendage. The plant grows naturally in the bogs of Carolina; the flowers are white, and grow in corymbs, resembling umbels. There are also several species of Sundew (*Drosera*), which exhibit a similar phenomenon in the leaves. Those near the root are covered with long red bristles or hairs, bedewed with a sticky juice, possibly of a poisonous quality, especially destructive to insect life. If a fly settles on the upper surface of the leaf, it is first detained by the clammy liquid; and then every hair turns inwards towards and over the insect, and remains curled, not only till the prisoner is dead, but until he is entirely consumed. The disc, which before was contracted and cone-like, then expands to its fullest breadth, and the hairs again become erect. It has, however, been thought that its fly-catching powers only consist in the viscosity of the leaves and hairs, and that any movement in the latter may be accounted for on the hypothesis, that by the motion of the hairs, or any part of the leaf, others may come in contact with and adhere to them. Hence an insect touching the leaf would find no possibility of escape, for amidst these globules of slimy liquid, every struggle would but render its extrication more impossible. Scientific men are equally at a loss to account for the use of the fly-catching properties of this plant, as they are with regard to others. Some have thought it to act merely in accordance with the law by which one thing preys upon another, so that nothing may become too abundant; and thus the *drosera* is made an instrument of destruction, useless to itself, but subservient to the general good. There is something peculiar in the time and manner of the flowering of this genus, for few of the species are ever observed with their flowers expanded; and some persons have concluded that they either never properly expand, or that their expansion takes place at sunrise, and they quickly close again, or that it occurs at night. The fact is, they open about ten o'clock in the morning, and generally are closing about twelve. The usual flowering time is July, when they may be found in most of our marshes; the leaves have a very novel appearance under a microscope: their loose cellular tissue glistening like gold, the fine long scarlet hair, tipped with a crimson knob, from which there exudes a clear white liquid, which on being touched with the finger, will draw out into a transparent thread more than an inch long, are all seen to very great advantage. Their medicinal properties appear to be very trifling; for the most part they are acrid and poisonous. Sometimes the irritability wholly resides in the flower; this is the case with the common *Barberry-bush*. The manner in which the stamens are spread out renders them incapable, without some assistance, of casting their

pollen on the head of the stigma. When an insect enters the flower in search of honey, and its legs or body touch the inner part of each filament near the bottom, which it cannot well avoid, the filaments immediately contract; each of them bending over, strikes its head against the top of the stigma, where it deposits the pollen, and by this means imprisons the insect. Its confinement, however, is seldom of long continuance, for, after a time, some degree of exhaustion appears to take place, and the stamens become partially flaccid, of which circumstance the insect generally takes advantage and makes its escape. After this the stamens fall back to their usual situation, and shortly recover their irritability, which continues not merely whilst the anthers are discharging their pollen, but extends more or less beyond even the falling of the corolla. No remarkable movement of the stamina takes place on touching them in any other part than the inner near the bottom. The stamens of *Opuntia Tuna*, a South American plant, introduced in 1781, is endued with a similar irritability, but the stamens do not form so compact a prison as *Berberis*. Another plant, the produce of our British woods, presents also a very curious structure—the *Aristolochia clematitis*; of this plant, which is so curiously formed, Professor Willdenow asserts that the anthers, of themselves, cannot impregnate the stigma. The throat of the flower is lined with thick hair or bristles, pointing downwards, so as to form a funnel similar to the entrance into a wire mouse-trap. The insects may very easily walk in, but are totally unable to return, in consequence of the points of the hairs meeting them. It sometimes happens that several enter into one flower, where, their confinement becoming irksome, they keep constantly moving about, and thus stimulating the filaments, the anthers deposit the pollen upon the stigma; but, after impregnation is performed, the hair shrinks, becomes flaccid, hangs down close by the sides of the flower, and the little prisoners then leave their cage. The insect that frequents this plant is a species of gnat (*Cecidomia*), although a writer in the Annual Medical Review doubted the accuracy of the fact; but it has since been proved, by occular demonstration, the flowers inclosing the very insects having been sent several miles.—*Paxton's Magazine of Botany*. No. III.

ON GROWING FERNS AND OTHER PLANTS IN GLASS CASES.

BY N. B. WARD, ESQ., F.L.S.

I was accidentally led, about four or five years ago, to make some experiments on the growth of ferns, &c., in closely glazed vessels, from the following circumstance. I had buried the chrysalis of a sphinx in some moist mould in a large bottle covered with a lid. The insect attained its perfect form in about a month, when I observed one or two minute specks of vegetation upon the surface of the mould. Curious

to observe the development of plants in so confined a situation, I placed the bottle outside one of my windows with a northern aspect. The plants proved to be one of *Poa ánnua*, and one of Nephrodium [Aspídium *Sw.*] *Filix-más*. In this situation they lived for more than three years, during which time no fresh water was given to them, nor was the lid removed. The fern produced four or five new fronds every year; and the *Poa* flowered the second year, but did not ripen its seeds. Both plants ultimately perished, from the admission of rain water, in consequence of the rusting of the lid. I have repeated this experiment, with uniform success, upon more than sixty species of ferns belonging to the following genera:—*A*splenium, Aspídium, *A*diántum, *B*léchnum, Cheilánthes, Davállia, Dicksonia, Doódia, Grammitis, Hymenophyllum, Lycopodium, Nephrodium, Niphóbolus, *P*olypodium, *P*teris, and *T*richómanes. Various other plants, vascular, as well as cellular, and more particularly those which delight in humid situations, succeed as well as the ferns. Among others may be enumerated:—*O*'xalis Acetosélla, *A*nemone nemorosa, Dentaria bulbífera, Paris quadrifolia, Verónica montana, Lístera (Neóttia) Nidus avis, &c. The method of proceeding is very simple. The ferns, &c., may be planted in boxes of any size or shape, furnished with glazed sides and a glazed lid. The bottom of the box should be filled with nearly equal portions of bog moss, vegetable mould, and sand; and the ferns, after planting, should be most copiously watered, and the superfluous water allowed to drain off through a plughole in the bottom of the box: the plug is then to be put in tight, the glazed lid applied, and no farther care is requisite than that of keeping the box in the light. In this way many plants will grow for years, without requiring any fresh supply of water. It is scarcely necessary to point out the advantages which this plan (subject to some modifications, according to the nature of the enclosed plants) offers to the horticulturist, and to the physiological botanist. To the one, it furnishes a ready mode of importing most plants, without risk, from the most distant regions of the globe; and, to the other, the opportunity of making more accurate experiments than have hitherto been practicable, on many important points connected with vegetable economy; such as on the germination of seeds, and the development of plants in various kinds of air and soil.—*Gardener's Magazine*. Vol. X.

FLORISTS' FLOWERS.

In pursuing this part of our subject it will not be necessary to enter into minute practical details, since such information may be obtained from most of our popular works on Floriculture. We think it preferable to introduce select lists of the choicest and most desirable florist-flowers, pointing out the properties for which they are most esteemed, together with such incidental remarks on their cultivation as may be considered either new or interesting.

THE TULIP.

Tulips are divided by Florists into early and late blowers, and the latter, which are most esteemed, are usually distinguished by the following names :—

1. Bybloemens	. . .	Having white grounds, broken with different shades of purple.
2. Bizarres	. . . . .	Having yellow grounds, broken with various shades of purple, or scarlet.
3. Roses	. . . . . .	Having white grounds, broken with rose, scarlet, or crimson.
4. Breeders	. . . . .	Are plain and whole coloured, occasionally breaking into various colours, by which new varieties are produced.
5. Selfs	. . . . . .	Are either white or yellow, and admit of no further change.

'A Bybloemen, Bizarre, or Rose Tulip, is called flamed, when a broad irregular stripe runs up the middle of the petals, with short abrupt projecting points, branching out on each side; fine narrow lines, called arched and ribbed, often extend, also, from this broad stripe to the extremity of the leaves; the colour generally appearing strongest in the inside petals: a Tulip with this broad-coloured stripe, which is sometimes called beamed, or splashed, is at the same time frequently feathered also. It is called feathered when it is without this broad stripe; but yet it may have some narrow lines, joined or detached, running up the centre of the leaf, sometimes branching out and curved towards the top, and sometimes without any spot or line at all; the petals are feathered, more or less, round the edges or margin, inside and out; the pencilling or feathering is heavy or broad in some, and light or narrow in others; sometimes with breaks or gaps, and sometimes close, and continued all round.'—*Hogg's Supplement on Florists' Flowers.*

CONCISE RULES FOR CULTIVATING TULIPS.

BY A CONTRIBUTOR TO THE HORTICULTURAL JOURNAL.

1. Choose an open dry situation for your bed, dig it out two feet deep, four feet wide, and as long as you please.

2. If vegetables grow well with you, and you are free from wire-worm and grub, fill up your bed with the top spit of your soil taken from where it has not been manured since the last crop, making it level a foot higher than the surface, it will settle down to six or eight inches.

3. Any favourable day in November regulate your bed, and with a dibbing trowel, or if you have not one, a blunt dibber large enough for the roots, make holes three and a half to four inches deep, beginning six inches from the side and continuing six inches apart every way. Each row across the bed will hold seven.

4. If you know the names of your roots, Groom's or Brown's catalogues will show you what row they should be placed in to keep the

shortest growers outside and the tallest in the centre, and you can arrange them in boxes of seven compartments in a row before you begin to plant.

5. Place the roots upright in the holes, and fill up with the same kind of mould you grow them in.

6. Keep off the cats the best way you can. I poison them if they will eat fish and arsenic. If you have proper irons and a net, use them: if not, bend some willow sticks or hoops to form an arch and cover with old netting.

7. Trouble yourself no more about them till the middle of March, they should then be covered if possible in storms of hail which injure them frequently a good deal.

8. When the bloom-bud appears cover at top against frost, but unless it is very severe indeed do not close the mats at bottom, tulips always want all the air they can have.

9. When the bud is five or six inches high, if you have a stage, get your top cloth up ready, but never cover more than you can help.

10. When the colours begin to show, cover just so much as will keep off the sun; but in cloudy days let them have all the air you can. If you have no stage use hoops and a cloth that will turn the water, for they must not be wetted when the buds are opening.

11. At all times shelter them from violent winds by mats or cloths or some other break on the windy side.

12. When the bloom drops break off the seed-pods, and let them have all the weather till the stalks and leaves turn yellow, and die down, when you may choose a dry day to take them up.

I could give many more directions, but when a young beginner with all his disadvantages will follow these short rules, and during the season visit other growers, he will not fail to please himself at home and improve himself out.

I would advise inexperienced amateurs who have never grown named tulips, to apply to Groom, of Walworth, Brown, of Slough, Rollison, of Tooting, or any other regular grower of these flowers for a proper assortment to commence with. For ten pounds they would procure a small collection well adapted to gratify them, and comprising some flowers which, although reasonable from the great quantity in cultivation, have nevertheless not been exceeded in beauty by any new or expensive sort. Any one of these dealers would send a man to plant them the first time, and success would be certain. When they have grown them a season they will see if the soil can be improved; but I advise as little trouble as possible at first, for if no experiments are tried, there can be no mischief follow.—*Horticultural Journal.* No. IV.

Mr. Groom, of Walworth, an eminent florist, has at our request furnished us with a list of tulips and other florist-flowers selected from his general catalogue just published. In the following selection of tulips, Mr. Groom has attended more to the quality than to the scarcity of the variety, which will account for the very low prices which he has attached to some very excellent flowers. We have been anxious to

procure such a list that those who may feel desirous of possessing a fine display of tulips may not be deterred from cultivating so beautiful a flower from an erroneous impression that extravagant prices will be required to ensure a fine collection.

	£	s.	d.
4. Ambassadeur d' Hollande. Byb. . . .	0	8	0
2. Beteral's Brulante Eclatante. Rose . . .	6	6	0
1. Bienfait Incomparable. Byb.	0	5	0
3. Captain White. Biz.	0	2	6
4. Catafalque. Biz.	1	1	0
3. Charbonnier Noir. Biz.	0	7	6
3. Claudiana. Rose	0	15	0
4. Comte de Vergennes. Rose	0	8	0
1. David Pourpré. Byb.	1	10	0
4. Emperor of Austria. Biz.	1	10	0
1. Fleur des Dames. Rose . . :	0	7	6
2. Homer (Groom's). Byb.	3	3	0
2. Imperatrix Florum. Byb.	1	10	0
1. Julia. Rose.	0	7	6
2. Lac. true. Rose.	10	10	0
2. Mentor, or Reine de Sheba. Byb. . . .	1	0	0
4. Platoff. Biz.	0	10	6
2. Polyphemus. Biz.	2	2	0
2. Pompe Funebre. Biz.	8	8	0
2. Queen Adelaide (Groom's). Byb. . . .	10	10	0
4. Rosa Blanca. Rose	1	1	0
2. Rose Camuze de Craiz. Rose	5	5	0
3. Rubens. Byb. . . . , ...	0	7	0
3. Surpasse Catafalque. Biz.	0	2	6
2. Triomphe d'Hollande. Rose.	0	5	0
4. Violet Alexander. Byb.	1	11	6
3. Violet Rougeâtre. Byb.	0	10	6
3. Wm. Pitt (Holmes'). Biz.	0	7	6

In Mr. Groom's Catalogue, the figures in the first column, as above, denote the row in which the sort should be planted; that is, No. 1, may be planted in the first or seventh row; No. 2, in the second or sixth; No. 3, in the third or fifth; and No. 4, in the centre row.

Inexperienced persons who may be desirous of purchasing a collection of tulips may have them arranged for planting, at the prices given in Mr. Groom's Catalogue; thus, a bed of 30 rows, containing 210 bulbs (named) including many fine sorts, may be had for only 10*l.*; a fine assortment, including several of the newest varieties, 15*l.*; and a similar collection comprising several of the most esteemed varieties in cultivation, 30 guineas. By this arrangement the purchaser is able to obtain a finer assortment of tulips with two or three bulbs of a value, equal to the price of the whole collection.

THE PROPERTIES OF THE TULIP.

Extracted from the *Horticultural Journal and Florists' Register*, a spirited publication, containing much sound practical information, and evidently conducted by a talented writer and first rate florist.

The properties to constitute a perfect tulip may be laid down as completely as they have already been with respect to dahlias; and we set out by affirming that if one stand were composed of extravagantly priced flowers, and another were made up of those which might be had for a shilling each, the value and scarcity *alone* of the dearest flowers would not constitute a single point in their favour.

1.—FORM.

The cup should form, when quite expanded, one-third of a hollow ball. To secure this: 1st, the petals should be six in number, and broad at the ends, and smooth at the edges, that the divisions may not be conspicuous.

2nd. The three inner ones should set close to the three outer ones; and the whole should be broad enough to allow of the fullest expansion without quartering, (as it is called) or exhibiting any vacancy.

3rd. The petals should be thick, smooth, and stiff, to keep their form well.

The ordinary form of the tulip has warped the judgment of many fanciers, until they almost believe the shape of some tulips cannot be improved upon; and there are those who would dispute with us the propriety of that we have said would be perfection. All those who have written about the properties of a perfect tulip, mention among other matters that it should form a fine cup, and they mostly leave us in the dark about what is the form of a fine cup. If they mean a tea-cup, the perfection must vary annually, and be dependent on the taste of the manufacturers of porcelain and crockery; and as to any other kind of cup that we know of, we fear we should get no nearer; we, therefore, define it upon principles which cannot vary with fashion, in as much as circles will most likely be round, and squares have four corners to them, for some time to come, particularly as there was no attempt in the Reform Bill to alter these mathematical laws.

The reason we say it should be one-third of a hollow ball is this: All fanciers know that the beauty of a tulip depends on the entire inside surface, for a blemish there destroys it. They know too that unless the entire inside surface can be seen at one time it must be seen under a disadvantage. It is clear, then, that to be enabled to see all the inside surface at once, the top of the cup must be largest, and any turn inwards at the top of the cup would hide part of the beauty, and -larly of many feathered tulips where the principal pencilling is top; we arrive thus easily at one point, namely, that the ist expand enough to open the internal beauties to the spec- if there be more than one-third of the circle, it will not do ally: one moment's observation will convince: though one- rfect, half a ball would not be materially worse, but it

would be worse, for the depth would be one objection. The consequent uprightness of the petals near the top would deprive us of the perfect sight of the feathering, and forms a second objection. If there be any more than half, say two-thirds, the tops would turn in, and the depth would be still greater; but it must be kept in mind that we speak of the form when expanded. The tulip which expands more must be flat and uninteresting; that which does not expand so much is ineffective. As to whether the circle is better than the shoulder or the elliptic there cannot be two opinions after due consideration, for the circular sweep is more graceful than a shoulder, and shows the character far better (particularly towards the upper part of the petals), than an elliptic, for the sides are not so upright.

2.—GROUND.

The ground should be clear and distinct, whether white or yellow; the least stain, even at the lowest end of the petal, would render a tulip comparatively valueless. There are persons who dislike a creamy white or a very pale yellow; but a moment's consideration will suffice to show that whatever be the ground, so that it be clear, distinct, stainless, and entirely of one hue, there can be no legitimate objection, though the brighter the yellow, or the more perfect and snow-like the white, the more valuable must be the flower. We, however, condemn altogether those flowers, whose grounds are a mixture of white and yellow, struggling, as it were, for precedency, and each on some spots getting the better. Yet there are some noble bed flowers of this description which must be grown until we get better. It is, however, clear, that in a stand they would be placed behind all those whose grounds were clear and wholly of one shade or hue, be that hue or shade what it may.

3.—COLOUR AND CHARACTER.

Roses, bybloemens, and bizards, are the three classes into which tulips are at present divided. In each of these there are several different characters; and it *has been* thought difficult to decide which should have the preference: we, however, see no difficulty in the matter. A feathered flower, and a flamed flower, are fine in their way, and each contains a good property; but there can be no difficulty in giving the preference to a flower which possesses both properties, if they are both clear and distinct.

Whatever be the disposition of colour, whether feathered, flamed, or both, all six petals should be alike; they are rarely, perhaps never, found so, but such would be perfection, and the nearer they approach it the better. The feathering should be distinctly marked, and whether narrow or wide, should be distributed so far round each of the petals as to form, when they expand, a uniform edging all round the outer edge of the flower. In a flamed flower the flame of colour should be as distinct in the centre of the petals, as the feathering is at the edge of a feathered flower; a fine bold or delicate stripe up the centre of each petal, and if branching at the side, the fine pencilling pointing

outwards, but not to reach the edge nor must the colour approach near the bottom. If the flame, as is sometimes the case, has a broad base running nearly across the petal, it often forms a star round the clear circle of ground at the bottom, and if perfect, is the most beautiful style of flame. The perfection, however, of a flower possessing both flame and feather, would be to have each distinct and independent, and the one not to reach the other. In all the classes and varieties, spots, or splashes, or blotches of colour, ununiform or out of place, are so many blemishes; all patches or blotches (which are generally of the original breeder colour), are defects not to be looked over in a stand; but many flowers come so marked, and are nevertheless good flowers in a bed, though not fit to exhibit for a prize.

The colour should be rich, delicate, or bright, all of which distinctions, we believe, can be well understood; and whether it be the one or the other, it should be dense and decided. The most delicate violet may be as decided as the richest crimson, or black, or the brightest scarlet, and the edges of every mark of it should be as smooth as though an artist had carefully laid it on; if it has run or flushed the least in the world into the ground colour, or if any pouncy specks or roughness extend beyond the feathering, or marking, it is objectionable. If there be two distinct colours, one lighter or darker than the other, but each so divided as not to run into one another, the beauty of a flower is greatly enhanced; but if they mix, or run into each other, and are in parts undecided, the flower is not good. On this account, many *tricoloured* flowers, as they are called, would be decidedly objectionable; for most of them have their colours so blended, and run into each other, that they hardly exhibit one perfect feature, and though beautiful in a bed are inadmissible as show flowers. Those which have both yellow and white in their grounds would certainly be discarded, for they are neither bybloemens nor bizards, and thus would be considered to disqualify a stand of blooms.

About the height of a tulip we are careless, for two good reasons: first, when they are cut for a stand, the height does not appear; and second, because there are four different heights required in a first-rate tulip-bed, and the tallest are in the middle and most inconvenient to look at. We might give another reason why we are careless about height, it is this: We have seen twelve inches difference in two persons' growth of the same flower, and therefore look at it as a secondary consideration; if it be above twenty inches it is sure to be right as to one of the four necessary heights for arrangement; and if we had to decide what we would have any new extraordinary fine tulip, it would certainly not be for the middle or tallest row. The notion of thirty inches for the stem of a tulip was entertained when clean bottoms were of secondary consideration; but now that nothing but a clear, fine, spotless, and stainless ground colour to the very centre is indispensable, we like to be able to see that centre which was once the least perfect, the most ugly, and therefore the most necessary to be placed above the reach of our curiosity by the length of its stem. If we had some new

and striking tulip with a grand large bloom, bright or strange colour and a stained ground or dirty blue centre, we should pray for a stem long enough to keep the bottom of the inside from view; but if every thing else was perfect and therefore unobjectionable, we should be very desirous to have it not too tall to look into.

In reverting to the form of a tulip, we cannot help observing that the circle which we point out as the perfection of shape is very rarely seen, most of the very finest being inclined to give out at three of the petals, and form a sort of triangular-shaped cup, instead of a round one. So objectionable is this, though some of the scarcest, and in respect to other properties, the best are so, that a flower which is not worth a shilling from its plentifulness, would beat another worth fifty pounds, if the former were nearer round than the latter. In like manner, if three of the petals stand up, and three expand, or take rather different forms, so as to interrupt the circle of what would be the rim of the cup, that flower can have no chance against a bloom which is compact and more round; and the fanciers of tulips will do well to get as many as they can of all the old flowers which in form and character possess the properties we have endeavoured roughly to sketch out, for they would beat nine-tenths of the dearer, scarcer, and more esteemed varieties.

THE AURICULA.

The Auricula is one of the most beautiful of our early spring flowers, and though not so extensively cultivated as formerly, is still a great favourite with many.

THE PROPERTIES WHICH CONSTITUTE PERFECTION IN THE AURICULA.

The properties of the Auricula may be divided into three series, namely, those of the single pip, those of the single plant, and those of a pair as usually shown.

THE PIP.

1. Should be round, large, smooth at the edges, without notch or serrature, and perfectly flat.

2. Its centre or tube should not exceed one-fourth of the diameter of the pip; it should be of a fine yellow or lemon-colour, perfectly round, well filled with the anthers or thrum, and the edge rise a trifle above the paste or eye.

3. The paste or eye should be perfectly round, smooth, and white, without crack or blemish, and form a band or circle, not less than half the width of the tube, all round it.

4. The ground colour should be dense, whole, and form a perfect circle next the eye, and on the outer part be finely broken into a feathery edge, the brighter, darker, or richer the colour, whichever it may be, the better the flower; but if it be paler at the edges of the petals, or have two colours or shades, it is a fatal defect.

5. The margin or outer edge should be a fine unchangeable green or

gray, and be about the same width as the ground colour, which must in no part go through to the edge. From the edge of the paste to the outer edge of the flower, should be as wide as from the centre point of the tube to the outer edge of the paste—in other words, the proportions of the flower may be described by drawing four circles round a given point at equal distances, the first circle forming the tube, the second the eye, the third the ground colour, and the fouth the outer edge, and the nearer they approximate to this (except that the ground colour and green break into each other in points), the better the flower.

OF THE PLANT.

1. The stem should be strong, round, upright, and elastic, well supporting itself, and from four to seven inches high.

2. The footstalks of the pips should be so proportioned as to length and strength, that all the pips may have room to show themselves, and form a close compact truss, of not less than seven in number, without lapping over each other, and all alike in colour and property.

3. The truss is improved if one or more leaves stand up well behind the flowers for it assists the truss, and adds much by its colour to the beauty of the pips.

4. The foliage should be healthy and well grown, and almost cover the pot.

OF THE PAIR.

1. The pair should be of equal height and size in truss and foliage.

2. The colours of the flowers should be as much contrasted as possible, so that in that particular, a green and gray edge, or a black and a bright ground, or a dark and a light green, or any other contrast, would be a point over equally good flowers not so contrasted.

Other points might be mentioned; but these are the obvious properties not to be lost sight of in appreciating this beautiful flower.—*Horticultural Journal.*

The following is a list of Auriculas, selected by Mr. Groom from his Catalogue:—

	£.	s.	d.
Bearles's Superb	0	5	0
Booth's Freedom	1	10	0
Cockup's Eclipse	0	5	0
Faulkner's Ne plus Ultra	1	1	0
Grime's Privateer	0	3	0
Kenyon's Ringleader	0	2	6
Laurie's Glory	0	15	0
Leigh's Colonel Taylor	3	0	0
Page's Champion	0	15	0
Smith's Britannica	0	15	0
Smith's Princess Charlotte	0	6	0
Stretch's Emperor Alexander	0	7	6
Warris's Prince Blucher	0	4	0
Waterhouse's Conqueror of Europe	1	10	0

THE CARNATION.

The varieties of this beautiful flower exceed four hundred in number. They are divided by florists into the three following classes:—

1. Bizarres, characterized by having not less than three colours, in irregular spots or stripes.

2. Flakes, distinguished by having two colours only, and their stripes large, going quite through the leaves.

3. Picotees have a white or yellow ground, spotted or pounced with scarlet, red, purple, or other colours, and are further distinguished by the serrated margins of their petals.

We give a list of carnations, picotees and pinks selected by Mr. Groom from his catalogue. The price affixed is for one pair of each sort.

		s.	d.			s.	d.
Bijou de Clermont.	*Scarlet Biz.* ...	5	0	Josephine.	*Scarlet Flake.*	4	6
Roi de Capucins.	*do. do.* ...	5	0	Pearson's Rising Sun.	*do. do.* ...	3	6
Wilmer's Conquering Hero.	*do.* ...	5	0	Bellerophon.	*Purple Flake.*	3	6
Cartwright's Rainbow.	*Crimson Biz.*	5	0	Castle's Mrs. Barrington.	*do. do.*	5	0
Medwin's Lord Eldon.	*do. do.*	5	0	Wood's Commander in Chief.	*do.*	3	6
Wakefield's Paul Pry.	*Pink & Purple Biz.*	3	6	Davey's Tower of Babel.	*Pink Flake.*	4	0
				Hardman's Lady Wellington.	*do*	3	6

PICOTEES.

		s.	d.			s.	d.
Faulkner's Salamanda.	*Red Edged.*	3	0	Cartwright's No. 2.	*Purple Edged.*	4	0
Martin's Black Prince.	*do. do.*	5	0	Donna Maria. ...	*do. do.*	4	0
——— Prince George.	*do. do.*	5	0	Fletcher's Amelia.	*do. do.*	2	6
Pearson's Wonderful.	*do. do.*	4	0	Hogg's Minstrel. ...	*do. do*	5	0
Will Stukely.	*do. do.*	2	6	Martin's Complete.	*do. do.*	5	0
Woollard's Miss Bacon.	*do. do.*	4	0	Princess Victoria. ...	*do. do.*	5	0

The criteria of a fine Carnation.—The stem should be strong, tall, and straight. The calyx about an inch long, sufficiently firm at the top to keep the base of the petals in a circular form, rising about half an inch above the calyx; the outer petals turning off gracefully in a convex form, ably supporting the interior petals, which gradually decrease as they approach the centre, forming an imbricated surface, so that their united beauties may at once meet the eye. The outer or broad end of each petal should be without either fringe or indenture, and of whatever colours the flowers may be composed, they should be perfectly distinct; each petal should have a due proportion of pure white, bizarres rather less than one-half, flakes one-half, and picotees rather more than one-half. Bizarres are generally esteemed preferable to flakes when their colours are rich and gradually distributed, although not running in regular stripes from end to end of the petals, as in flakes, which should have their colours disposed in long regular stripes, narrowing gradually to the base of each petal, and ending in a fine point.

PINKS.

	s.	d.		s.	d.
Barnard's Bexley Hero	2	6	Green's Princess Charlotte	2	0
Barratt's Conqueror	2	0	Hoggart's Queen Caroline	2	6
Cheese's Miss Cheese	2	6	Knight's Lady Acland	2	6
Dakin's Sir F. Burdett	2	0	Norman's Benjamin	2	6
Davey's Lady Shannon	2	6	——— Woolwich Beauty ...	2	6
Dry's Earl of Uxbridge	2	6	Smith's Blush Superb	2	6
Foster's Wm. IV.	2	6			

Criteria of a good Pink.—The stem should be strong, elastic, and erect, and not less than twelve inches high. The flower should not be less than two inches and a half in diameter, the petals should be large, broad, and substantial, and free from large, coarse, deep notches, or indentures; in short, they approach nearest to perfection when they are rose-leaved, or without any fringe at all. The broad end of the petals should be perfectly white and distinct from the eye, unless it be a laced pink, which should be bold, clear, and distinct, leaving a considerable portion of white in the centre, perfectly free from any tinge or spot. The eye should consist of a bright, rich, dark crimson, or purple, resembling velvet, but the nearer it approaches to black the more it is esteemed; its proportion should be about equal to that of the white, that it may neither appear too large nor too small.

THE RANUNCULUS.

We verily believe that there have not been more specifics for human maladies by the empirics of the last century, than there have been "best methods of growing and blooming ranunculuses;" and yet, there is as great an uncertainty as ever as to obtaining a good bloom or producing good roots.

We have, within the last year, observed very closely several beds of ranunculuses almost all similarly treated, excepting that there may have been three weeks or a month difference in the time of planting. They were all planted in loam but little dressed, and freely watered as soon as they came up. They were all shaded from the extreme hot sun; indeed, fiom the time the bloom begun to rise, they had no sun at all, but the results were very different.

Two beds, comprising a thousand blooms each, which had not grown in the same situation before, bloomed even to a root; there was not, as far as we could observe, one missed. But for this mass of bloom there seemed a penalty to pay; for many of the roots came up very small indeed, and some altogether went off. Two other beds of fine roots had a partial bloom, but those which bloomed were fine. A fifth bed, planted at the middle or end of March, bloomed and took up fine; and two beds planted at the usual time had not one bloom to the hundred roots. In the two beds first mentioned, the bloom was profuse, the stems rose very high, and the foliage almost covered the bed. Upon the whole the only point ascertained correctly was this, that all the roots new to the soil bloomed the best.

But our experience in growing ranuuculses leads us no further than to the conclusions already generally come to, and often published, namely, that they delight in good strong rich loam; that manure not perfectly decomposed is poison to them; that cow-manure is better than horse-manure; and this should be laid nine inches or a foot below the surface, and that the cleaner the loam in which the roots are planted is, the better they will grow and take up.

Another, and almost a certain conclusion is, that wherever an extra-

ordinary fine bloom is produced, the roots take up smaller, and the bloom of the following year is lessened, if not destroyed. But we have no faith in any of the specifics put forth as infallible; and generally speaking, the monstrous absurdities seriously recommended, seem so calculated to destroy instead of to preserve the health of the roots, that we almost fancy the object of the writers is to rid the fancy of the superabundance, that their own stocks may be the more valuable.—*Florist's Register*.

A select list of Ranunculuses from Mr. Groom's Catalogue:—

	s.	*d.*		*£.*	*s.*	*d.*
Burns. *white edged*	6	0	Duke of Buccleugh. *Grey* ...	0	2	6
Esther, *do. do.*	3	6	Henriette. *Crimson*	0	1	6
Henning, *do. do.*	5	0	Alphonso. *Red*	0	1	6
Louisette, *do. do.*	2	0	Holloway. *Rosy*	0	3	6
Shakspeare. *white spotted* ...	5	0	Proserpine, (Groom's). *Rosy*	1	1	0
Venus. *White edged*	1	0	Marquis of Sligo, (Groom's). *Yellow Mottled* ...	0	5	6
Le Temeraire. *Red & White striped*	2	0	Nestor. *Yellow edged*	0	2	0
Hercules, (Groom's). *Dark Purple*	3	0	Cedo Nulli. *Orange*	0	1	0
Kemperfelt, *do. do.*	3	0	Carlos. *Olive*	0	1	6
Œil Noir, *do. do.*	4	0	Gray. *Light Purple*	0	3	0

Criteria of a fine double Ranunculus—'The stem should be strong, straight, and from eight to twelve inches high, supporting a large well-formed blossom, at least two inches in diameter, consisting of numerous petals, the largest at the outside, and gradually diminishing in size as they approach the centre of the flower, which should be well filled up with them. The blossom should be hemespherical; its petals should be imbricated in such a manner as neither to be too close and compact nor too widely separated, but have rather more of a perpendicular than horizontal position, to display their colours with better effect.

'The petals should be broad and have perfectly entire well-rounded edges; their colours should be dark, richly clear, or brilliant, either consisting of one colour throughout, or be variously diversified, on an ash-white, sulphur, or fine-coloured ground, or regularly striped, spotted, or mottled, in an elegant manner.'—*Groom.*

THE DAHLIA.

Nothing new can well be added on the culture and management of the dahlia. There still exists a great discrepancy of opinion in reference to the essential properties of this highly-esteemed flower. We therefore subjoin some excellent remarks on the properties which constitute perfection in the dahlia, extracted from the Horticultural Journal, to which judicious instructions we now earnestly direct the attention of the reader. The rules insisted on by this popular writer are founded on correct taste, and have consequently been approved by the Metropolitan Society of Florists, and are or *ought* to be observed by all who undertake to determine the comparative merits of this class of flowers. To the general cultivator or amateur these remarks may also be useful by affording him the means of estimating the properties

of those flowers from which alone he should select seed to obtain new and choice varieties.

On the properties of the Dahlia.—Were we not confident of being able to found a proper standard for every distinct beauty we seem to discover, and to give a sound reason for every feature we require, as the properties of a perfect flower, there would be some risk in descending from general points to detail; but we take strong grounds, and before we close our labour on this subject, we shall be in a condition to challenge our fellow-cultivators. We insist first on form being the most essential point; so much so, indeed, as to sink all the other properties. What then is perfection of form? We will figure it as well as write about it. It should be half a ball, if you look at it sideways; if you look at it in the front, a perfect circle.

We fear no difference of opinion on these points, but we will nevertheless give our reason for them. It should be half a ball, first, because the whole of the faces of the petals can be seen at one view in front; and secondly, because on looking sideways it looks clear, stiff, and well formed underneath. The only flower which is perfect on the outer edge, and thus forms a perfect circle, without notches, is the Springfield Rival; this fails on the side view, because the eye does not rise to the top, and the back petals reflect. The most beautiful bloom we have seen of it out of some hundreds, being somewhat sunk in the centre.

It is however a question if we ever get a flower perfect in all respects, for almost every grower says the Springfield Rival is the *best*. Our notions, then, of perfection may be estimated thus: would the Springfield Rival be handsomer if the eye or crown rose up to a complete half-circle, with all its present beauties? secondly, would it be better if instead of the present reflection of petals on the under side, they were perfectly square and flat? If these points be conceded, our notions of perfection are established; for certainly in the beauty and accuracy of these petals no art could effect an improvement, nor could the compasses of a mathematician improve the circular outline of the Springfield Rival, as you view it in front.

The next feature of importance, still however belonging to the form, is the shape of the petal: to form a complete circle the ends should be broad in proportion to the length, for if narrow or pointed, the flower forms a star instead of a circle; and whether we look to the taste of the mere nosegay-lover, or the refined notions of the amateur and florist, all alike prefer the one to the other, even those who cannot tell us why they give the preference; for the same reason the fimbriated or notched edges to the petals are equally objectionable. The next question is, whether a petal should be cupped, or flat, or convex: to this we may say it is possible to have a flower of each class beautiful in its way, but the preference must be given to those petals which are moderately concave, for several reasons: first, they appear the most alive and fresh; secondly, the colour, be it what it may, is enriched by reflection; thirdly, it enables us to see more surface of colour in less space, upon the prin-

ciple that if half an inch of surface be bent, it takes less room than if straight; and whether a polished or opaque surface, it is the richer for the concavity.

The concave petal, however, may be of different kinds, one of which would be a total disqualification; for instance, a broad petal curled up all along like a gutter, would be intolerable; yet some are so destitute of taste as to prize a flower of this kind, though were it the finest colour, texture, brilliancy, and (in other respects) form, to us it would be unworthy of a place in a common potato-field. One rule may be adopted as a pretty general one, and would seldom mislead: if a flower, by concavity or quilling, or whatever it may be called, exhibits any portion of the back of the petal in front of the flower, the judge who did not condemn it must be one of very shallow pretensions. The concavity of the petal should never, by rights, reduce it much in breadth, nor interfere with the position of the next petal; it may be of the slight concavity of the finest ranunculus, which enables every succeeding row to fit almost close, or it may be of the concavity of the Springfield Rival, or of Barratt's Susiana—a flower not half appreciated—or of Perfection. Or they may have petals very slightly concaved; but if the wrong side of the petals can be seen in front, it is impossible to be a good flower.

The next kind of petal not objectionable are those nearly flat, but exhibiting still a degree of freshness and stiffness which give brilliancy to the flower. Look, for instance, at Augusta, which in perfection is as beautiful in its way as almost any one of the whole class, though not without fault, as may be seen by reference to our test. A convex petal gives an appearance of tameness; and though we have many beautiful specimens of this kind of petal, they are only shown because we have not others of the colour so good. Of the flowers exhibiting this dead appearance, Lady Fitzharris is one; but it wants almost every requisite in other respects. The petals of this flower always hang down when the bloom is held up; and on this hanging of the petal depends even the little approach it has to the half-globular form. Lady Grenville is a better flower by many degrees; but although its petals lay beautifully regular, and when in perfection form a fully convex shape, it depends for that shape on the turning backward of the petals, and not to a naturally high crown, for it is the reverse. It is, however, in the absence of others of the colour, shown with advantage; though if not artificially raised above the natural height of the tube, will sink much below them, as all the flower seems below the calix.

If then perfection of form is half a globe or ball, those flowers which deviate from it may be of two kinds, and both good in their way; for instance, they may be more or less than the half of a globe or ball, but still preserve the fine crown, which is indispensable. If they form less than half a ball, they may be very pretty, and might be shewn; but they would have a flat appearance: and if they contained more than half, they would be far better. Of the first kind we might instance the flower already named, Lady Grenville; and of the second perhaps

there is no better than the Countess of Liverpool: and these are two very simple guides in judging the approach to perfection of form. The flower which contains more than half a ball must be better than that which contains less; because, although you cannot see on the front view any of the reflected petals, you can see to the extent of half the ball, and the presence of the remainder is no evil; whereas, the other has a deficiency of property, detrimental to its richness and general appearance. We have already said that the back of a petal should never be seen on a front view of a flower. This leads us to observe that there is a numerous class of flowers in cultivation which exhibit a bunch of petals turned towards the centre, while the blown ones are all laid down flat; and when these centre ones lay themselves down, they expose the disk or eye. This class of flowers is to us intolerable; the entire centre shows only the dull backs of the upright unblown petals peeping from the green skins at their base. These flowers will be consigned to the common borders, or discarded. The new flower called Watt's Metropolitan, of which we have seen a few good specimens, has a fault which will always prevent its being a favourite in the stand,—it is almost flat. Its form is so bad, that the beauty of its colour is no compensation for its deficiency of shape; and there is scarcely one bloom in fifty which does not quill enough to show the backs of the petals.

Large flowers are for the most part very flat; for the Royal Lilac, which is one of the best when blown to perfection, exhibits its inseparable fault, flatness. And the same may be said of most others; while many also have another fatal failing—long, narrow, or pointed petals: and now that judges will look for good properties, nearly the whole tribe will be discarded as show flowers. Wilmot's Superb is a specimen which it is impossible to pass over silently while mentioning large flowers. It is the only one of the giant tribe at all tolerable in form; and though in the general way a coarse flower, we have seen specimens supremely beautiful. Size, however, unless accompanied with the property of form, must stand for nothing; nay, it is a disadvantage. Next to form ranks colour, which should be clear and striking, whether self, striped, mottled, or shaded. A white or yellow ground, with pouncy dots or blotches, ought not to be tolerated. Most of the light flowers are very bad in this respect; and except that they are singular and make a variety, are unworthy of notice. It is not sufficient that a dahlia should be oddly marked, for if they are to be shown they ought to be well marked. A dahlia with the petals tipped or edged with colour different from the ground, is pretty; but if this edging be composed of only rough blotches, disposed irregularly, and the petals coarse, it is inferior in property to a self colour which is clear. Distinctness in all bicoloured dahlias is indispensable; and the thousand and one light flowers with blotches, stripes, shades, and edgings, which have been tolerated for the last few seasons, are hardly fit to be looked at off their plant; for with half a dozen exceptions, it is difficult to find any fit for a stand. As yet, no white has

approached the King of Whites for the property of form and clearness of white; and whatever colour or hue a dahlia may have, it is necessary it should be clear: those which have the appearance of a stained white, as if the colour or hue had been sparingly laid on, must be bad. It is quite possible that the lightest shade of colour should be as perfect as the darkest; that is, that the flower should seem as if moulded originally of the coloured matter, instead of appearing, as hundreds do, to be made originally of a dirty white, and afterwards stained.

The following selection of Dahlias may unhesitatingly be relied upon as containing the finest varieties in cultivation, equally adapted for the flower border and for floral exhibition:—

	feet.
Ariel. *White, beautifully edged with lilac*	4
Battel Rival. *Fine Yellow*	5
Beauty of Cambridge. *White tipped with purple*	5
Burgundy, (Mountjoy's). *Cream*	4 to 5
Bride, (Harding's). *Fine white*	5
Cassina. *Finely cupped red*	5
Cedo Nulli. *Yellow, edged with red*	3
Clio. *Primrose, tipped with light purple*	4
Countess of Liverpool. *Finely formed scarlet*	6
Countess of Sheffield. *Light rosy purple, fine form and beautifully cupped*	5
Dennisii. *Fine ruby*	5
Desdemona, (Brown's). *Pure white edged with rose pink*	3
Enchantress, (Wells's). *White, edged with purple*	4
Gem, (Brown's), *White, beautifully tipped with rosy pink*	4 to 5
Glory, (Douglas's). *Fine scarlet*	5
Grandiflora. *Dark red, beautifully striped*	4
Granta. *Fine dark claret, cupped petals*	4
Hermione. *White, tipped with lilac, fine flower*	5
King of Beauties. *White, edged with rosy lilac*	4
King of Whites. *Fine white*	5
Lady Anne, (Hopwood's). *White, beautifully tinged with lilac*	3
Lady Anne Coke. *White, edged with purple*	3
Lady Fordwich. *Shaded blush*	3 to 4
Lady of the Lake, (Wells's). *White, edged with purple*	4
Lilac perfection. *Finely formed lilac*	5
Metropolitan perfection. *Dark excellent form*	6
Miranda. *Fine ruby; cupped petals*	4
Mrs. Broadwood. *White, tipped with lilac, beautifully cupped*	6
Napoleon. *Dark puce, finely cupped petals*	4 to 5
Newick Rival. *Delicate rose, excellent form, cupped petals*	5
Othello. *Dark puce, fine flower*	4
Page's Yellow. *Pale yellow, good form*	4 to 5
Paragon, (Wells's). *Yellow, tipped with pink*	5
Perfection, (Wells's). *Fine blush*	5

		feet.
Porsena.	*White, with lilac margin*	3
Prince of Orange, (Douglas's).	*Fine bright orange*	4
Queen of Dahlias.	*White, edged with rosy lilac*	3
Springfield Rival.	*Rosy crimson cupped petals*	5
Vandyke, (Douglas's).	*Pink, tinged with bronze*	5
Vesta.	*Dark brilliant rose*	3

THE ROSE.

The following judicious remarks on the culture of Roses have been derived from the Catalogue of Mr. T. Rivers, just published.

Moss Roses.—Most of the varieties prefer a cool soil, though Mossy de Meaux is perhaps an exception, as it seems to flourish better in light dry soils. The white moss, unless budded on the dog rose (*rosa canina*) will not in general grow well; its sickly appearance in some situations may be often traced to its being worked on some improper stock; if on its own roots in rich soils, it will often change to pale blush. All are well adapted for standards; but to have them in perfection in warm dry situations, in March put round each stem, *on the surface of the soil,* the fourth of a barrowful of manure; on this, place flints or moss, to take off its unsightly appearance, and make a little ornamental mound. This treatment will keep the soil cool, and cause the trees to bloom in a most superior manner, even in situations previously thought to be most ungenial to their culture. The manure should be spread on the surface in November, and lightly forked in.

Perpetual Roses.—A clump or border of perpetual roses will soon be indispensable in every well-furnished flower-garden. They are perhaps the most desirable of all the pleasing families of Rosa; like their prototypes, they are highly fragrant, and if possible, more so in September, October, and November, than in June. As every shoot in most of the varieties produces bloom, the soil cannot be too rich; for with these, luxuriant growth will be sure to give abundance of flowers. A good practice would be to cut off all the bloom-buds in June, and shorten the shoots to about half their length; then water them with manured water in July and August; this will make them shoot and bloom most luxuriantly all the autumn.

Climbing Roses.—It will be something of a novelty to apply climbing roses as underwood, but I know of no plant so eligible for elegant undergrowth in a wilderness near pleasure grounds, as the varieties of rosa sempervirens; they grow in every description of soil with great luxuriance; under the shade of trees they are nearly evergreen, and with their beautifully shaped and delicately coloured flowers, are calculated to form the prettiest mass of undergrowth it is possible to conceive. They grow with increased vigour when their shoots are prostrate; and if a large space is required to be covered with them, they may be planted thin, and the ends of the most vigorous shoots laid in the ground; in a few years, by these means, acres of ground may be

covered with them. On standards with short stems they make very ornamental plants for lawns; if they grow luxuriantly the ends of the shoots will descend, and if not shortened, will produce the following season, corymbs of flowers at every bud, forming a dome-shaped mass, having a fine effect.

Noisette Roses.—These have resulted from a happy intermixture of the China rose with the old musk rose, and from it we have numerous varieties, partaking in a pleasing manner of both parents; in many the clustered habit and peculiar fragrance of the musk rose prevails, in others the perfume and magnificent flowers of the tea-scented roses are apparent, together forming a most elegant family. Some of the clusters of flowers are so large, that I have found 60 to 80 in one corymb. The constant succession of flowers, till the chills of November prevent the opening of the buds, makes them highly interesting. They are all very hardy, and as standards seem to show their varied characters with better effect than as dwarfs.

L' Isle de Bourbon Roses.—This is a most beautiful family, scarcely known in this country. The original or common l'Isle de Bourbon rose was sent to France in 1822 from the Mauritius, by the brother of M. Foisette, a nurseryman at Paris; it is semi-double, and seems to have the character of a distinct species; it bears seed in great profusion, but though thousands of seedlings have been raised, the produce of good varieties have been but in small proportion to the bad; however, we have added to our collection many that are very interesting, like the China roses, of which they have been considered a division, they are perpetual bloomers; but they have a luxuriance and gracefulness quite their own; the perfect and elegant form of their flowers, the extremely delicate tints in some, and vivid rose colour, so peculiar to these varieties, in others, will soon establish them in the favour of the rose amateur; as standards they grow most luxuriantly, are quite hardy, and bloom in greater perfection late in autumn than any other perpetual rose.

Sundry Directions.—In unfavourable soils, roses require being removed, and their roots trimmed every third or fourth year; in cold clayey soils, the best compost for them is rotten dung and pit-sand; in warm dry soils, cool loam and rotten dung. Annual pruning, which is quite essential, should always be done in October, or in March; but October pruning will be found greatly advantageous, as the rose will then prepare itself during the remainder of the autumn, for vigorous growth in spring.

The families of roses are now so well defined, that each ought to have its department; a clump of hybrids for their gorgeous colours in June and July; of perpetuals, for their fragrance in the cool autumnal months; of noisettes, for their elegance and abundance of flowers; of Scotch roses, for their precocity and humble growth. In short, all require separate culture to have them in perfection; but this of course will only apply to flower-gardens rather extensive. Climbing roses for pillars should be planted in a very rich soil, as they will then put forth

strong central branches of eight or ten feet in length; these, when fastened to the stakes, will furnish a plentiful supply of lateral blooming shoots for many seasons. Climbing roses to cover a sloping bank, as their flexible branches can be pegged to the ground in any direction, is perhaps a new idea—they will form a beautiful carpet of foliage and flowers, the dark crimson, and white varieties blending with peculiar elegance. I also hope to give more zest to rose culture, in suggesting that all the perpetual, *Isle de Bourbon*, and noisette roses from their vigorous habits and tendency to flower, may be made fine objects for ornamenting the hall, &c., during the autumnal months; for this purpose they should be put into large pots, and well furnished with surface manure and plenty of water in summer, their blossoms ought also to be cut off just before expansion, as mentioned in the directions for the culture of these roses. The crimson perpetual rose has also been forced in France with fine effect. "The pots (twenty-fours,* of the London potteries, 8 inches deep, 7½ over) plunged in the natural soil to the rims, a deep frame placed over them, and the heat kept up with linings of hot dung," giving air as required. This fine autumnal rose, when thus forced and blooming in March or April, is most beautiful, as the short flower-stalks are lengthened by this mode of culture, adding to the elegance of the plant, its flowers are erect (unlike many other forced roses), and lose none of their colour and fragrance, *for all these autumnal roses should be 'worked' on the dog-rose stock, as its vigorous and easily exercised habits are quite necessary*; in fact, with the exception of the climbing roses (*to be grown as climbers*) and a few others, this stock is the only medium by which many choice roses can be brought to perfection.

A limited selection of roses where the varieties are so numerous and taste is so capricious would afford but little satisfaction. We must therefore refer those who are desirous of making a selection, either to Mr. Rivers's catalogue, or to similar lists published by other nurserymen.

MANAGEMENT OF PLANTS IN ROOMS.

To treat on the proper management of plants in houses is a subject attended with considerable difficulty: every genus requiring some variation, both in soil, water, and general treatment. If the room where the plants are intended to be placed is dark and close, but few will ever thrive in it;—if, on the contrary, it is light and airy, with the windows in a suitable aspect to receive the sun, plants will do nearly as well as in a green-house. But if they are observed to suffer, the effects may generally be traced to one of the four following causes:—Want of proper light and air,—injudicious watering,—filthiness collected on the leaves,—or, being potted in unsuitable soil.

1st. *Want of proper light and air.*—is perhaps the most essential point of any to be considered; for, however well all other requisites

* For autumnal flowering they will require pots more than double this size, say eights or twelves.

are attended to, a deficiency in either of these will cause the plants to grow weak and sickly. Let them always be placed as near the light as they can conveniently stand, and receive as much air as can be admitted, when the weather will allow. Indeed those persons who have no other conveniency than the house to keep them in, will find that they derive immense advantage from being, during fine weather, in spring and autumn, turned out of doors in the evening, and taken in again in the morning,—the night dews contributing greatly to their health and vigour.

2nd. *Injurious watering,*—does more injury to plants in rooms than many persons imagine. To prevent the soil ever having a dry appearance, is an object of importance in the estimation of very many; they therefore water to such an excess that the mould becomes sodden, and the roots consequently perish.—Others, to avoid this evil, run exactly into the opposite extreme, and scarcely give sufficient to sustain life. This, however, is by no means so common a practice as that of giving too much; for in general, if any thing appears to be the matter with the plants, large doses of water are immediately resorted to; and if recovery is not speedy, this nostrum is again administered, with but little doubt of its infallible restorative powers:—but such persons, like an unskilful physician who gluts the weakly stomach of his patient, only hastens on what they are trying to prevent. This overplus of water will show its bad effects by the very dark colour and flabby disposition of the leaves; and if the plant receives too little, the leaves will turn yellow, and eventually die.

The best plan is, to always allow the soil in the pot to have the appearance of dryness, (but never sufficient to make the plant flag,) before a supply of water is given, which should then be pretty copious; but always empty it out of the pan or feeder in which the pot stands, as soon as the soil is properly drained. The water used for the purpose; ought always to be made about the same temperature as the room in which the plants grow,—never use it fresh from the pump,—either let it stand in a warm room all night, or take off the chill by adding a little warm water to it, or the growth of the plants will be much checked.

3rd. *Filthiness collected on the leaves,*—may either arise from insects, or dust; the former may be speedily remedied, by placing the plants under a hand-glass, or any thing that is convenient, and burning some tobacco until they become well enveloped in the smoke;—and the latter may be removed by occasionally washing them with pure water, either by means of a syringe, the rose of a watering-pan, or with a sponge, when the filth still adheres.

4th. *Being potted in unsuitable soil,*—is by far the most difficult part of the business to rectify, for no certain line can be drawn, unless each genus was treated on separately; however, as this cannot be done in a paper like the present, a few general remarks, which perhaps, with some little exceptions, may be found to be pretty correct, must suffice.

All plants whose branches are fragile or slender, and roots of a fine thready, fibrous texture, with general habits like the *Erica*, as *Diosma, Andersonia, Epacris, &c.* will require the same soil, (peat earth) and very similar treatment to Cape Heaths. Those whose wood and general habits partially differ, and whose roo's are of a stronger texture, as *Acacia, Ardisia, Stenocarpus, Tetrathica, Tristanea, &c.*, will require a portion of sandy loam,—in many cases about equal parts; and where the habits, &c. differ materially from the heath, only a small portion of peat earth will be required, and a compost may be made a little rich, by the addition of well rotted dung.

Almost all Cape and other bulbs, as *Sparaxis, Ixia, Gladiolus, Tritonia, &c.*, thrive best in a mixture of light rich sandy loam, leaf mould, and a little peat. Shrubby and herbaceous plants, with luxuriant roots and branches, as several species of *Myrtus, Jasminum, Hibiscus, Hermannia, Heliotropium, &c.* require rich loam, lightened with leaf soil, without any portion of peat. Plants with powerful roots, and but slender heads, as *Veronica, Senecia, Scutellaria, Ruellia, Maurandia, &c.*, require a light sandy soil, mixed with a small portion of leaf mould and very rotten dung. At the time of potting, always lay plenty of broken potsherds at the bottom of each pot, to give a good drainage.

It will be seen that these directions do not allude to either orchideous, succulent, or aquatic plants. Many of the orchideæ require a portion of decayed wood mixing with the soil—others grow in damp moss; but these being chiefly stove plants, will not flourish in a room; there are several species, however, that thrive very well both in the green-house and in rooms, as *Arethusa, Calopogon, Dendrobium, Ophrys, &c.*, the soil suitable for these is a mixture of about equal parts of light sandy loam and peat; very little or no water must be given when they are not in a growing state.

Succulent plants of all descriptions require very little water, and in general are very easily managed in rooms; many of them thrive in a mixture of sandy soil and lime rubbish, as *Aloe, Cacalia, Cactus, Aizoon, &c.*; others grow well in a mixture of equal parts of light sandy loam and peat, as *Coris, Cotyledon, Mesembryanthemum, &c.*

Aquatic Plants, as *Villarsia, Actinocarpus, &c.*, generally do well in a mixture of peat and loam, and require to be constantly kept in a wet state; indeed the best way is to place the pot in a deep pan or feeder which should always be kept filled with water.

Bulbs of most sorts flourish in rooms with less care than most other kinds of plants. Hyacinths should be planted in Autumn. In preparing pots for them, select such as are about four inches deep and three inches wide, put a little rotten dung in each pot, fill each pot up with light rich soil, and plant the bulbs so shallow that nearly half the bulb stands above the soil; plunge the pots in the open air, and cover them six or eight inches deep with rotten bark. During spring take them out as they are wanted to bring into flower, and set them in the window of a warm room where they will be fully exposed to the

sun. Those who do not possess a garden may set the pots in a cellar or outhouse, or in the corner of a yard, and cover them with light soil or sand until they are wanted to bring into the room to flower. When the leaves begin to decay after they have done flowering give them no water; when the leaves are dead, take them out of the soil and remove the offsets, and lay them in an airy situation until the time of planting.

If grown in water-glasses, they require to be placed in a light airy situation, and the water will require to be changed once in three or four days. If drawn up weakly, it will be necessary to support the stems with sticks, split at the bottom so as to fit on the edge of the glasses at the top. This however will not be necessary if they be kept in a light and airy situation. When out of flower, plant them in pots of soil to perfect their leaves, and treat them as above; they will then flower again the succeeding year.—*Paxton's Magazine of Botany.*

FLORICULTURAL CALENDAR.

JANUARY.

Sow.—Towards the end of the month, Dahlia seed, Mignonette, and and Ten Weeks' Stock.

Plant.—If the season will permit, the Anemone, Dahlia, Hyacinth, Jonquil, Narcissus, Pancratium, and Persian Iris.

Propagate. *By division of the root.*—Daisies and Thrift, if required for edgings.

Miscellaneous Directions.—The flower garden requires but little attention this month, beyond that of affording occasional protection to the more delicate plants and flowers.—*Dahlia* seeds require to be sown in pots of light earth, placed in a hot-bed frame, and when up, potted off and gradually inured to the air. The roots of choice Dahlias, when extensive propagation is required, should be plunged in old tan or in a moderate hot-bed.—The beds of *Tulips, Hyacinths, Ranunculuses*, and *Anemones*, should be covered with light dry litter.—*Auriculas* should be top dressed about the end of this month.—*Flower-borders* may be dug or trenched in fine weather, and fresh earth or compost added when requisite.—*Slugs* should be destroyed by hand-picking, or what is preferable, *clear* lime water; as lime is but sparingly soluble in water, one ounce will be found sufficient for an ordinary-sized pail of cold water.—*Worms*, which are very destructive to Lawns, are also easily destroyed by this means. The turf should be watered, two or three nights in succession, with the lime-water, employing a common watering-pot for that purpose.

FEBRUARY.

SOW.—Towards the end of the month, the Auricula, Dahlia, Hardy Annuals, Mignonette, Ten Weeks' Stock, also Tender Annuals, which require the aid of heat to force them for early blooming.

PLANT.—The Anemone, Box-edgings, Dahlia, Gladiolus, Tigridia pavonia, Turban Ranunculus, Perennial Roots, and Herbaceous Plants. *Transplant.*—Carnation layers, Flowering Shrubs, and Evergreens.

PROPAGATE. *By division of the root.*—The Campanula, Lobelia and other Hardy Plants.

MISCELLANEOUS DIRECTIONS.—*The Auricula* and *Polyanthus* should be sown in boxes of light rich soil, the surface of which should be made perfectly smooth and level, and the seed deposited tolerably thick and covered about a quarter of an inch with very light and finely-sifted mould.—*German* and *China Aster* seed should be sown in a slight hot-bed, or in pots placed in moist heat. The young plants should be gradually inured to the open air, and when large enough, be planted at the distance of four or six inches apart, on a slight hot-bed, or a border, where protection can be given if required; as soon as the weather will permit, they should be finally planted in the open border, in a soil of rich loam. By this treatment they will grow two or three feet in height, and produce fine flowers.—*The Tigridia pavonia* should be potted in a rich soil, and placed in a hot-bed frame.—The roots of the *Lobelia* should be divided and potted singly, in a similar compost.—The *Auricula* plants should be dressed as directed last month.—*Choice Flowers* should be protected, during severe weather, by the usual means.—*Auriculas, Carnations,* and *Pinks* should be occasionally looked over, and decayed leaves carefully removed.—*Turf* may now be laid.—The *flower-borders* should be neatly dug and kept free from weeds.

MARCH.

SOW.—Early in the month, Auricula, Balsam, Carnation, China Aster, Chrysanthemum, Cockscomb, Dahlia, Lobelia bicolor, L. gracilis, Nicotiana fragrans, Polyanthus seeds, Ten Week and Russian Stocks, and Tender and Hardy Annuals. Towards the end of the month, Hardy and Tender annuals, Biennial and Perennial Flower seed, and Tigridia pavonia.

PLANT.—Anemones, Box, and other edgings. Carnation layers, Dahlias, Ranunculus, Tigridia pavonia, Deciduous shrubs, Evergreens, and Herbaceous plants. *Transplant.*—Clarkia pulchella, Coreopsis tinctoria, Œnothera, Lindleyana, Mignonette, Schizanthus pinnatus, and other Annuals sown in Autumn.

PROPAGATE. *By Cuttings.*—Cacti, China Roses, Hydrangea, and Pelargoniums. *By division of the root.*—Daisies, Thrift, Lobelias, and other Herbaceous plants.

MISCELLANEOUS DIRECTIONS.—*Auriculas* should be top-dressed if the operation was deferred last month, and if purchases be made, the plants should invariably be received in pots, for the auricula, if trans-

planted at this season of the year, never flowers in perfection.—*Balsam seed* should be selected from the finest double flowers, the smallest and middle-sized seed should be preferred and sown in pots of rich soil, and covered about a quarter of an inch with mould and placed in a hot-bed frame; when fit to transplant, they should be potted in small pots (60's), then replaced in the frame, be kept shaded, and well watered. They require to be re-potted and again placed in the frame, and finally, planted in pots twelve inches in diameter, and then placed in a green-house, for flowering, giving abundance of water at least twice a-day in warm weather. By this management Balsams have been grown upwards of five feet in height, and completely feathered, from top to bottom, with most beautiful double flowers.—All kinds of *flower seeds* sown in open borders should be sown in patches about ten inches in diameter, the border being previously forked up and some rich mould sifted over it, the seed may then be deposited and covered with finely-sifted mould, pressing the earth closely upon the seeds, to ensure their vegetation.—*Dahlia* roots may now be put into pots and placed in a cold frame or pit.—Cuttings of the *Hydrangea* should be taken from the tops of those shoots that have plump leading buds. The cuttings should be made about an inch below a bud or joint, and each cutting inserted singly in small pots. When placed in moist heat, they will readily strike root, and by this treatment they make perfect and beautiful plants.—*Geranium* cuttings planted in small pots and placed in a hot-bed frame, and potted off when they have taken root, will flower during Autumn.—The *Cacti* are an interesting tribe of plants, and from the singularity of their growth and the beauty of their flowers, they are very generally cultivated. They are easily raised from cuttings, if planted in a suitable compost. The cuttings may be made of the required length, and then laid in a dry place for a few days, that the wound may dry up previously to planting, or they will be very liable to damp off. The compost best adapted for the cuttings, as well as the plant, is one composed of sandy loam and about a fourth-part of lime or brick rubbish. The pots require to be well drained. The cuttings should be inserted in small pots filled with the above compost and placed on a shelf as near the glass as convenient. The cuttings and the old plants require scarcely any water except at the time of flowering, when they may be more liberally supplied. The Cactus speciocissimus will scarcely flower without the aid of heat. It succeeds best when placed out of doors, in the summer, or in the green-house if the season be too cold. After the plant has been thus exposed for a few weeks, it should be replaced in the stove, where it will speedily blossom. When re-potting is required, the operation should be performed immediately after flowering.—*Annuals* sown in pots in the Autumn and those self-sown in the border, if potted off before winter, will, with slight protection, be fit to transplant this month; these plants will be much finer and come earlier into blossom than those sown early in the spring.—*Fuchsias* may be easily propagated from young shoots, pulled off when an inch and a half long, inserted in pots of equal parts, sand, peat, and

leaf-mould, and placed in a warm situation.—*China, perpetual, moss,* and *noisette roses* may be grafted on the Briar, or on the common blush China.—*Auriculas, Tulips,* and other choice flowers should be protected in severe weather.

APRIL.

Sow.—Brompton Stock, Dahlia, Hollyhocks, Mignonette, and Tigridia pavonia, Tender, Half-hardy, and Hardy annuals.

Plant.—Carnation layers, Dahlias, Tigridia pavonia.—*Transplant.* Biennials and Perennials.

Propagate.—*By Cuttings.*—Biennial Stocks, Campanula pyramidalis, Ericas, Erythrina Crista-galli, Honeysuckle and Jasmine, Pansies, Pelargoniums, Salvias, Rocket, China Roses, Verbenas, and Wall Flowers.—*By division of the root.* Dahlias, Biennials, and Perennials, Hepaticas, and Violets.—*By Offsetts.* The Auricula, Campanula pyramidalis, and Polyanthus.

Miscellaneous Directions.—Cuttings, or offsetts of the *Campanula pyramidalis,* should be planted in fine rich soil and peat, and covered with a hand-glass, or they may be struck in heat. When they have taken root they may be transplanted in a shady place in the flower-border; after remaining one year in that situation, they should be potted in large pots containing a very rich compost, and they will flower luxuriantly.—*Erythrina Crista-galli* may be propagated by stripping off young shoots, when about four inches in length, leaving a portion of the bark attached. The slips should be inserted singly in small pots of loam and sand, and then plunged into a hot-bed.—*The Rocket* will succeed by cuttings, but the method recommended by Mr. Whiddon appears the most eligible where extensive cultivation is required. As soon as the plants have done flowering, the flower stems are shortened to half their length, by which means new shoots are emitted. A quantity of soil should be drawn round the roots, and if the weather be dry, the plants occasionally watered, the strongest shoots from either the roots or the stems should be removed in succession when of sufficient length, and be planted under a south wall, in a compost of equal parts loam, leaf soil, and sand.—*Tulips* will now be coming into flower, and should be protected from heavy rains, winds, and the mid-day sun. Should a bulb die, or send up an imperfect flower, it may be remedied by substituting one from the open ground, and the following ingenious device suggested by Mr. Maund, for the removal of plants, will be found well adapted for that operation. "Small plants may be very neatly and safely transplanted from the borders, by making narrow trenches round them, and filling such trenches with plaster of Paris mixed with water to the consistence of a thick cream. This quickly becomes hard and forms a pot, by which the plant may be taken up without disturbing the roots. With a little ingenuity, the soil and roots may be so surrounded with the same material, as to greatly facilitate the safe removal of a choice plant to any reasonable distance."—*Cuttings* of the *China Rose* will freely strike

root without the aid of glasses, if placed in a green house.—*The Honey-suckle and Jasmine* will grow freely from cuttings of the previous summer's wood.—*Cuttings of the Salvia splendens,* S. coccinea, S. involucrata, S. angustifolia, S. cardinalis, S. Grahami, *Verbena chamædrifolia,* V. pulchella, V. Lamberti, if planted on a slight hot-bed, under hand-glasses, and potted next month, will produce fine plants for turning out in the open borders in June.—*Hepaticas* succeed best in a loamy soil; they should be divided when in full blossom, but not into very small heads; they are impatient of removal and should not be parted oftener than every third or fourth year.

MAY

Sow.—Annual and Biennial flower seed. Dahlia, Mignonette, Sweet Peas, and Ten Weeks' Stock.

PLANT.—Calceolarias, Dahlias, Fuchsias, Lophospermums, Pelargoniums, Petunia phœnicea, Salvias, and other Green-house plants. *Transplant* towards the latter end of the month.—Neapolitan Violets, and Annuals raised in frames or pots.

PROPAGATE.—*By Cuttings.*—Calceolarias, China Roses, Heliotropiums, and other kinds of plants intended for the open air.—*By Slips.* Lychnis, Rockets, Sweet William, and Wall Flowers.—*By division of the Root.* Herbaceous plants and Violets.

MISCELLANEOUS DIRECTIONS.—*Dahlia seeds* may now be sown in the open borders under hand glasses.—*Clarkias, German Asters, German Stocks,* Œnotheras and other Annuals should now be sown on a warm border, or slight hot-bed to flower late in the season.—When *flower seeds* are sown early in spring the earth should be sprinkled with water, which should be repeated alternate days in dry weather till the plants are established. Care should be taken in planting out Annuals to disturb the roots as little as possible. The more tender kinds should not be thinned till some time after they have been planted out. They should be watered at the time of planting, and for a night or two after.—The *Wall-flower* may be raised from Slips of the young wood, from three to six inches in length, and planted in a shady border in cloudy and damp weather.—The *Fuchsia,* which was formerly treated as a green-house plant, may by proper management be cultivated in the open air, and some of the taller varieties will in the course of two or three years attain the height of seven or eight feet. When properly disposed in beds, the taller in the centre and the others regulated according to their heights, they present a beautiful display of blossoms during the summer season. The beds for their reception should be prepared in the spring; and the compost best adapted for their growth is one composed of two parts of well-decomposed leaf mould, and one part of sand. About the beginning of May the Fuchsias should be turned out into the beds; they will grow freely during the summer; and seldom require protection in the winter; but if the weather should be severe, it would be advisable to protect the roots by mulching. The

plants should on no occasion be pruned in the winter season, but the stems should be cut down close to the ground early in April, and they will soon throw up abundance of young shoots. Fine young plants may be obtained by laying the shoots when about a foot high, and surrounding them with a compost similar to that in which the plants are grown; the layers should be tongued on the upper side, and pegged down about three inches beneath the surface. In about six weeks the layers will be rooted, when they should be detached, and planted in small pots (48's), placed in a cold frame, and carefully shaded.—*Neapolitan Violets* may be removed from the frames to the open borders. This fragrant flower is often in great request; and as many feel desirous to have the duration of its flowering prolonged throughout the winter, we feel much pleasure in giving insertion to the following excellent directions, kindly communicated to us by Mr. J. W. Thomson, gardener to Alexander Baring, Esq., Grange Park. Early in May the plants are taken from the frames, the whole of the earth being shaken from the roots. The largest are divided into three plants, the smaller into two; they are then planted in beds, four feet wide, in rows, one foot apart, and twelve inches in the rows. An east or west border should be chosen, and previously to planting be well dug, and highly manured with well-decomposed animal manure. If the summer prove dry they will require to be frequently watered; they should remain in the beds till the middle or latter end of September; they should then be taken up with a portion of soil adhering to the roots, and potted singly into pots (32's) filled with a compost consisting of equal parts of sandy loam, well-decomposed leaves, and rich animal manure, or bone dust, for the latter is preferable. When potted the plants should be well watered, and placed in a shady situation for a fortnight. About the middle of October the plants are plunged into a pit filled with old tan or leaves, and when so placed the plants should not be more than three inches from the glass; this is of great importance, for if the pots be plunged deeper into the beds, the plants are very liable to damp off in the winter months, and during this period they require but little or no water. Air should be freely admitted at all times, except in frosty or wet weather; for if wetted by rain, they would probably damp off. Mats should be used to protect them from frosts, and where fires are employed, the temperature should never exceed 40° or 45° of Fahrenheit's thermometer. The plants require to be frequently looked over, and decayed leaves removed; and during summer the runners should be taken off, as they tend to weaken the plant.

The *Petunia phœnicea* may now be turned out into the open borders, and it will flower profusely during the whole of the summer, till destroyed by frosts. This plant is of recent introduction, and is a valuable acquisition to the flower border. It may be readily raised from seeds, or cuttings planted in September.

Strong-growing *Herbaceous plants*, Asters, Phloxes, &c., by having their shoots well thinned out, will produce much finer flowers.

JUNE.

SOW.—Hardy and Half-hardy Annuals.

PLANT.—Cyclameus, Dahlias and Annuals.

PROPAGATE. *By Cuttings.*—Carnations, Chrysanthemums, Double Stocks, Heaths, and other Green-house plants, Lobelias, Pinks, Rockets, Sweet-scented and other China Roses, Sweet Williams and other Herbaceous plants. *By Layers.*—Carnations and Pinks.

MISCELLANEOUS DIRECTIONS.—*Cyclamens* as soon as taken up should be planted in pots, and plunged in the border to protect them in winter, if the weather prove severe.—*Bulbous-rooted plants* which have done flowering should be taken up in dry weather, and spread upon mats in a shady situation, and when dry, the offsets should be carefully detached.—*Anemones, Hyacinths, Polyanthuses, Narcissuses,* Ranunculuses, and Tulips, should be taken up annually; but Crocusses, Crown Imperials, Irises, Common Narcissuses, and Snowdrops, should be taken up only once in two or three years, in order to detach offsets, and for the purpose of propagation. The Autumnal flowering bulbs should be taken up as soon as the leaves have decayed, and may be replanted immediately, or kept out of ground till the latter end of July or the beginning of August.—*Cuttings of Herbaceous Plants* may be made from the lateral shoots of the stems, planted in fine sand in pots, or in a border prepared for their reception; they should be covered with hand or bell glasses, until they have taken root, when the glasses should be removed gradually; the cuttings require to be shaded daily, and watered sparingly.—*Double Stocks* may be raised by slipping off the side shoots in the early part of the summer, and planting them in a mixture of light earth and sand under a hand glass. Scarcely a single cutting will fail to strike, and plants raised in this manner are fully as beautiful as those raised from seed, and all of course have double blossoms. The young stems of *Lobelias,* being made into cuttings of five or six inches in length and inserted in an eastern border under a hand glass, will readily strike root. When well rooted, they should be planted into pots containing yellow loam, and a small quantity of leaf mould and sand, and placed in a green-house or dwelling-house. In the spring they should be repotted, and finally turned out in the open air. The suckers (which should always be taken off established plants in the autumn), if treated as directed for the cuttings, form fine plants in the spring.—*Young cuttings* of the sweet-scented and other *China Roses,* if planted in a shady border under hand-glasses, will readily strike root, and produce flowers in autumn. This is considered by some the best month for propagating these varieties.—*Green-house plants* may now be removed into the open air, in a sheltered situation, and a cloudy day should be chosen for that purpose.—*Auriculas* should now be potted, and *Carnations* top-dressed, removing about an inch of the old soil, and replacing it with a suitable compost.—*Dahlias in pots* should now be turned out in the open borders, if deferred last month.—*Polyanthus seed* may be gathered as soon as the pods begin to change their colour.—The *Salpiglossis*

and its varieties will flower well if turned out in the open borders in a rich dry soil in a sheltered situation.—All the varieties of the [illegible] may now be planted in the open borders, but the most imposing effect will be produced by planting entire collections in distinct beds.

JULY.

Sow.—Biennials, Hardy Annuals, Mignonette, and Sweet William.

Plant.—Anemones, Seedling Auriculas, and Carnations, Biennial and Perennial Seedlings, Hardy, Half-hardy and Tender Annuals, Offsets of Bulbs, and Tender Roots, Polyanthus Seedlings, and Ranunculuses.

Propagate. *By Cuttings.*—Azaleas, Calceolarias, Carnations, Dahlias, Ericas, Erythrina Crista-galli, Fuchsias, Linums, Pelargoniums, and other Green-house plants. *By division of the Root.*—Violets. *By Layers.*—Carnations.

Miscellaneous Directions.—*Hardy Annuals* sown in the beginning of this month come into blossom at the end of September.—*To obtain Mignonette in blossom* during the winter season the seed should be sown thinly in the open air towards the end of this month; about the middle of September the plants may be planted eight or ten in pots (32's), filled with a compost of equal parts leaf mould, mellow loam, and soft sand: the young plants may be subsequently thinned out if too much crowded. When potted they should be placed in a cold pit or frame, and shaded until they are established, and then exposed to the open air till the beginning of November, when they will be showing blossom, and should be removed to a green-house or drawing-room, where they will continue to flower during winter. Successive crops may be obtained by sowing them in pots (48's) filled with the compost above-mentioned. The seed should be sown about the [illegible] of August to produce flowers in January and February; and for flowering in March and April, the seed may be sown on the 6th of September. The pots should be plunged in a frame, and when the plants are an inch high, they should be thinned to about six in a pot, giving air when the weather is not frosty, but the lights must be closed in severe weather.—*Offsets from Bulbs*, and Tuber Roots, should be planted early in this month, as they are apt to shrivel if they are kept too long out of the ground.—*Azaleas* may now be propagated by cuttings of the young wood planted in sand under a hand-glass.—*Cuttings of Calceolarias, Fuchsias, Linums,* and *Pelargoniums,* should now be planted in a shady border, under a hand-glass.—*Cuttings of the Dahlia*, planted in sandy loam and placed in a hot-bed, will readily strike root. The cuttings should be taken off close to the parent branches, shaded for a few days, gradually inured to the open air, and then placed in a warm sheltered situation.—*Violets* should be propagated by cuttings, or by division of the root.—The layers of *Carnations* should not be deferred beyond the middle of the month: cuttings removed by a horizontal incision beneath a second or third joint strike

readily under a hand-glass.—*Roses* of every description, except the China and its varieties may now be budded, and also Orange and Lemon stocks.—*The Rose Acacia* will produce bloom in the autumn if the shoots be now shortened.—*Ranunculuses* should be carefully taken up and dried.—Plants of the *Biennial Stock* with single blossoms should be pulled up as they appear; those that are semi-double, or having five or six petals, should alone be reserved for seed, which almost invariably produce fine double flowers.

AUGUST.

Sow.—Auricula, Brompton and Ten Weeks' Stock, Hardy Annuals and Biennials, Mignonette and Polyanthus seed.

Plant.—Biennial and Perennial Seedlings, Bulbs, Cyclamen persicum.—*Transplant.* Auricula and Polyanthus Seedlings.

Propagate. *By Cuttings.*—Azaleas, Ericas, Evergreen Shrubs, Honeysuckle, Jasmine, Maurandya Barclayana, Pelargoniums, and Violets.—*By division of the Root.* Calceolarias, Herbaceous plants, and Violets.—*By Offsets.* Auriculas.

Miscellaneous Directions.—The *Auricula* should be sown in shallow boxes or pans, and shaded from the heat of the sun; they will blossom stronger than when sown in the spring.—The *following annuals* sown early this month will come into flower the latter end of November, and make a fine display for the green-house. The seeds require to be thinly sown in pots, and placed in heat until the plants are fairly up, when they should be placed in a warm and sheltered situation in the open air, and regularly supplied with water, and taken into the green-house or drawing-room about the middle of September:—Anagallis indica; Ageratum angustifolium; Browallia elata, and its varieties; Calceolaria pinnata; Calendula pluvialis; Calliopsis bicolor, and Atkinsonia; Clarkia pulchella; Cleome rosea; Iberis umbellata; Kaulfussia amelloides; tall and dwarf varieties of Larkspurs; Lychnis Cœli Rosa; Madia elagans; Mimulus floribundus; Petunia nyctiginiflora; Salpiglossis Barclayana, and other species; Schizanthus pinnatus, porrigens, retusus; Senecio elegans, *Valerianella* congesta; and Verbena Aubletia.—*Evergreens* may be successfully raised from cuttings early this month. The cuttings should not be shortened, and may vary in length from four to twelve inches, according to circumstances, none of the leaves should be removed, except those which would otherwise be buried in the ground, they should be inserted thickly in beds in a shady situation and be occasionally watered.—*Cuttings of the Maurandya Barclayana* inserted in a large pot and preserved in a green-house during winter will make good plants for turning out in the spring, as soon as the frosts are over.—*French and English rose*, and Lemon and Orange Stocks, may still be budded—*Calceolarias* flowering in pots will blossom again in the autumn, provided the entire branches be cut down to within an inch of the surface, at the period when the terminal flowers are in full blossom, which will generally be about the early part of this month, or the latter end of July. The soil should be removed from the pots

to the depth of about one inch, and replaced with fresh-sifted compost. The plants should be placed in a cold frame, and in about a month they will be fine vigorous plants, flowering if taken in doors during October and November. Offsets from the Herbaceous kinds, planted in the open borders, will also blossom in autumn, and if planted in pots will produce flowers in the house in September.—The *Honeysuckle and Jasmine* will strike freely from ripened cuttings.—*Flower seeds* of every kind should be carefully gathered as they ripen, and be preserved in paper bags, having their generic and specific names written on separate labels, one of which should be put within the bag, and for greater security the name also written on the outside of each package.—The *flower-borders* should be kept carefully cleaned and weeded, removing the stems of those herbaceous plants that are past flowering, and filling up every vacancy with calceolarias chrysanthemums, Fuchsia globosa, Heliotropes, Lobelias, Mesembryanthemums, Thunbergia alata, Salpiglossis, Salvias, Schizanthus, Senecio elegans and other plants raised in pots for that purpose.

SEPTEMBER.

Sow.—Agrimonia, Anthericum, Aquilegia, Clarkia, Chelone, Collinsia, Isotoma axillaris, Mignonette, Œnothera Lindleyana Schizanthus and Ten Weeks' Stock.

Plant.—Crocus and other Bulbs.—*Transplant* Hardy herbaceous plants, Hardy deciduous flowering Shrubs, and full grown Biennials, and Perennials.

Propagate. *By Cuttings.*—Chimonanthus fragrans, China Roses, Ericas, Fuchsias, *Petunia* phœnicea, and other delicate Green-house plants, Pelargoniums, Primula prænitens, Schizanthus pinnatus, Calliopsis and other annuals.—*By division of the Root.* Calceolarias and some of the Perennial Herbaceous plants.—*By Offsets.* Auriculas, Penstemons and Verbena.

Miscellaneous Directions.—The *Auriculas* directed to be sown this month should be sown in pots, and kept in a Green-house, or cool frame during winter, and they will bloom early and much finer than those sown in the spring: they will be ready to plant out in April.—The *Perennials* above-mentioned should now be sown, for if deferred till spring, the seeds will lie dormant for twelve months.—*Cuttings of China Roses* should be planted in a mixture of vegetable mould, peat, or pure sand, in a shady border covered with a hand-glass.—*Slips of Petunias, Heliotropiums, Salvias, and Pelargoniums* may be inserted in a pot placed in a hot-bed, and when struck root be removed to a green-house, or within-doors. The ensuing May they may be divided, and planted out in the open borders, where they will make strong plants, and blossom profusely.—The *Schizanthus Pinnatus, Calliopsis,* and doubtless other annuals, may be raised from cuttings by the assistance of a little bottom heat. When struck they may be preserved in a green-house, or dwelling-house during winter, and in spring may be turned out in the open border, where they will flower much earlier,

and much finer, than those raised from seed.—Beds should now be prepared for *Anemones, Hyacinths, Ranunculuses and Tulips.*—The roots of *Tigridia pavonia* should be taken up about the end of the month.—*Penstemons* may be raised from slips struck in heat. —*Green-house plants* should be taken into the house the latter end of this month.

OCTOBER.

Sow.—Adonis, Annual Stocks, Larkspur, Persicaria and other Hardy Annuals, Pansies and Tulips.

PLANT.—Towards the latter end of the month, Anemones, Biennials, Hyacinths, Ranunculuses, Tulips, and the more common sorts of bulbs.—*Transpant.* Trees and Shrubs of all kinds.

PROPAGATE. *By Cuttings.*—Calceolarias, Fuschias, Pelargoniums. —*By division of the Root.* Daisies, Herbaceous Plants, and fibrous-rooted perennials.

MISCELLANEOUS DIRECTIONS—*Hyacinths* may be planted in a light dry soil, in rows eighteen inches apart, and the plants six inches apart in the rows, or they may be planted in pots (48's) filled with a compost of equal parts sandy loam, vegetable mould, and well-decomposed animal manure; the pots being plunged to the rims in a warm south border, or frame, till the bulbs make fresh roots, and then introduced in a hot-bed, for forcing them into bloom. By this treatment they will blossom at Christmas.—*Bulbous-rooted Irises, Lillies,* Narcissuses, Crocuses and Snowdrops, that have not been removed for two years, should be taken up, divided and immediately replaced.—The root of *Cyclamen persicum* should be taken up about the middle of the month, repotted, placed in a cold frame or drawing-room.—*Fibrous-rooted perennials,* if planted out early in this month, will make fresh roots before winter, and will flower more vigorously and profusely than if deferred till spring.—To protect *Dahlias* from inclement weather, some old tan, or leaf mould, should be put round the stems to the depth of three or four inches, extending about a foot round the crown, which will prevent the incipient buds being injured or destroyed by frosts.—*The Auriculas* require protection, and should be placed in a frame admitting air at all times during fine weather; and water should be given very sparingly, if required.

NOVEMBER.

PLANT.—Before the middle of the month, Crocuses, Herbaceous plants, Hyacinths, Ranunculuses, and Tulips.—*Transplant.* Deciduous and Evergreen Shrubs.

MISCELLANEOUS DIRECTIONS.—*Hyacinths* will grow in any rich soil not too retentive of water, for though they require frequent watering, yet in stagnant moisture they rapidly decay. The soil most suitable to their growth is a richly manured loam, mixed with one third of sea or river sand. Florists employ various composts, but Mr. Maddock, a successful cultivator, recommends the following: one part leaf

mould, two parts well decomposed cow manure, four parts sea or river sand, and four parts sandy loam. The beds should be about four feet wide, and the soil should be removed to the depth of three feet six inches, and filled to the depth of nine inches with manure from an old hot-bed, treading it lightly down, after which the bed should be filled level to the surface with the compost. The compost should be prepared a few months before used, and the beds should be ready a fortnight before the time of planting. The bulbs may be planted the first week in November, eight inches apart, covering each bulb with a little sand, and the whole bed with a light sandy soil to the depth of four inches. Some cultivators plant them in pots twelve inches deep, and six inches in diameter, and keep them in a green house or within doors. The beds in the open air require occasional protection from frosts and rains. When the bulbs are in blossom, the stems require the support of propping sticks, which should be painted of a green colour, to which the stems may be tied with green worsted. As soon as they have done flowering, and the leaves are turning yellow, they should be taken up and carefully dried and preserved in boxes similar to those used for Tulips.—*Ranunculuses*, if planted in frames, will blossom in March or April.—*Dahlia seeds* should be collected early in the month; the receptacles containing the seeds should be gathered as the blossoms decay, and if spread singly in a dry situation, the seeds will retain their vitality much better than if separated from the receptacles. Dahlias require to be taken up towards the end of the month, and a dry windy day should be chosen for that operation. The soil should be carefully shaken from the roots so as not to twist the tubers, and then placed under cover until perfectly dry, as they are very liable to decay.—*Fuchsias* and other green house plants grown in the open border require to be well mulched to protect them from frost. —*Calceolarias* should be taken up, and kept in a cool frame or within doors till the spring, being careful not to give them much water.—*Beds of choice bulbs* may be effectually protected by a layer of sand and sawdust, or ashes and sawdust, spread over the mould to the height of three inches.

DECEMBER.

Plant.—Deciduous, and evergreen Trees and Shrubs.

Miscellaneous Directions—.*Tulips* and other *choice bulbs* will require to be protected by all the usual means.—Air should be given to *Mignonette and Ten Weeks' Stocks* in fine weather.—*Composts for Auriculas and Carnations* should be prepared.—*The borders* of the flower garden being carefully dug, will give an appearance of order and neatness, at a season when little else can be seen to please the eye: it will also assist to clear the ground of weeds, and the larvæ of insects, and render it capable of being more readily cultivated in the spring.—*Mantell's Floriculture, Second Edition.*

RURAL AND DOMESTIC ECONOMY.

PRACTICAL INSTRUCTIONS FOR THE MANAGEMENT OF BEES.

BY MR. THOMAS NUTT.

The object of the generality of persons who keep Bees, is—profit: and that profit might be indefinitely augmented were Bees properly managed, and their lives preserved—were the still extensively-practised, cruel, and destructive system superseded by a conservative one. Some few there may be in the higher ranks of life, who cultivate bees from motives of curiosity—for the gratification of witnessing and examining the formation and progress of their ingenious and most beautiful works, and with a view to study the instinct, habits, propensities, peculiarities, or, in one word, the nature of these wonderful little insects, in order to improve their condition, and to gain additional knowledge respecting their natural history, hitherto enveloped in much uncertainty, and very imperfectly understood. To this class of Bee-masters and *Bee-friends* the system of management to be explained in the following pages, will, it is hoped, unfold discoveries and impart facilities and improvements hitherto unknown in apiarian science. And they, whose sole object in keeping Bees is *profit*, may derive incalculable advantage from conforming to the mode of management, and strictly attending to the *practical directions* hereinafter to be detailed: because as their profits are expected to arise principally from honey and wax, it evidently must be for their interest to know *how* to obtain those valuable Bee-productions in their purest state and in the greatest quantity.

The schemes and contrivances to which apiarians have had recourse, in order to deprive Bees of their honey, without at the same time destroying their lives, have been various, and some of them ingenious; but hitherto not one of them has been crowned with the desired success. The leaf-hives of Dunbar and of Huber—Huish's hive with cross-bars,—the piling of hive upon hive, or box upon box, (called storifying), and several other contrivances, have all had this great object in view,—have all had their patrons and admirers,—have all had fair trials,—but have, notwithstanding, all failed of fully accomplishing it.

Now I feel warranted in asserting, (says Mr. Nutt), that my COLLATERAL BOX HIVES possess such conveniences and accommodations both for Bees and Bee-masters, that the pure treasure stored in them by those industrious little insects may at any time be abstracted from them, not only without destroying the Bees, but without injuring them in the least, or even incommoding their labours by the operation;—that they afford accommodations to the Bees which greatly accelerate the progress of their labours in the summer-season;—and that the Bees never leave them in disgust, as it were, as they not unfrequently *do leave* other hives, after being deprived of their stores; but, as if nothing had happened to them, continue day by day to accumulate fresh treasures, the quantity of which has astonished the beholders, and not only the quantity, but the quality also.

There has been some difference of opinion as to the most suitable dimensions for Bee-boxes. I approve of and recommend those which are from eleven to twelve inches square inside, and nine or ten inches deep in the clear.

The best wood for them is by some said to be red cedar; the chief grounds of preference of which wood are—its effects in keeping moths out of the boxes, and its being a bad conductor of heat. But of whatever kind of wood Bee-boxes are made, it should be well seasoned, perfectly sound, and free from what carpenters term *shakes*. Good, sound, red deal answers the purpose very well, and is the sort of wood of which most of my boxes have hitherto been made. The sides of the boxes, particularly the front sides, should be at least an inch and a half in thickness; for the ends, top, and back-part, good deal one inch thick is sufficiently substantial; the ends, that form the interior divisions and openings, must be of half inch stuff, well dressed off, so that, when the boxes and the dividing tins are closed, that is, when they are all placed together, the two adjoining ends should not exceed five-eights of an inch in thickness. These communication-ends, the bars of which should be exactly parallel with each other, form a communication, or a division, as the case may require, which is very important to the Bees, and by which the said boxes* can be immediately divided without injuring any part of the combs, or deluging the Bees with the liquid honey, which so frequently annoys them, by extracting their sweets from the piled or storified boxes.

The Bees are to be first placed in the middle box, for in this they first construct their beautiful combs, and in this the queen deposits in the cells prepared for the purpose by the working Bees, thousands upon thousands of her eggs, though she deposits no more than one egg in a cell at one time: these eggs are hatched and nursed up into a numerous progeny by the other inhabitants of the hive. It is at this time, when hundreds of young Bees are daily coming into existence, that my collateral boxes are of the utmost importance to the Bees

* For a full description of these boxes, we refer the reader to Mr. Nutt's volume, pp. 20—31.

domiciled in them; for when the young larvæ are perfected upon the cottage plan, a swarm is the necessary consequence. The Queen, with thousands of her Bee-subjects, leaves the colony, and seeks another place in which to carry on her astonishing labours. But as swarming may, by proper precaution and attention to my mode of management, generally be prevented, it is manifestly advisable to do so; for the time necessarily required to establish another colony, even supposing the cottager succeeds in saving the swarm, would otherwise be employed in collecting honey, and in enriching the old hive. Here, then, is one of the advantages of my plan, viz. *the prevention of swarming.* When symptoms of swarming begin to present themselves, and which may be known by an unusual noise in the box, and by the appearance of more than common activity among the Bees; when these symptoms are apparent, then the Bee-master may conclude that more space is required. At this period, therefore, the sliding tin should be withdrawn, and the bees be allowed to ascend the bell glass on the top of the middle box. But if by mistake the manager should draw up either of the collateral-slides, which divide the end-boxes from the pavilion, the Bees in that case will refuse to go up into the glass, and will commence their works in the collateral-box opened to them, in preference to the elevated glass; so well aware are these matchless insects of the inconvenience attending the carrying of their treasures into an upper room, when a more convenient store-house is to be had in a lower one. The natural movements of Bees have demonstrated to me this fact by more than a thousand trials; year after year I have made this experiment to my entire satisfaction. The natural movements of the Bees also suggested to me the idea of the utility of ventilation, and that by its influence their works might be both divided and purified; and that a place of safety might still be preserved for the Queen in the pavilion. She wants a certain situation in which to carry on the work of propagating her species. Like the fowls of the air, she will not, if she can avoid it, propagate her young whilst under the observation and influence of man; she, therefore, prefers the middle-box for her work of propagation, as well on account of its privacy, as because the ventilation of the end-boxes so cools their temperature, that they are not the situation nature requires to bring the young larvæ to perfection; yet they can be kept at such a temperature as to make them desirable store-rooms for the Bees' treasures. By this mode of management we prevent the necessity of swarming; and avoid the consequent risk and inconvenience attending the establishment of a distinct colony.

When the glass is nearly filled, which in a good season will be in a very short space of time, the Bees will again want accommodation. Previously, however, to drawing up the tin-slide to enlarge their crowded house, the manager should take off the empty end-box he intends to open to them, and dress the inside of it with a little liquid honey. Thus prepared, he must return the box to its proper situation, and then withdraw the sliding-tin between it and the pavilion, or

middle-box, and thereby enlarge the Bees' dominion, by opening an end-box to them, which will produce the greatest harmony in the hive. The Bees will immediately commence their operations in this new apartment. This simple operation, *done at a proper time*, effectually prevents swarming; and by it the Queen gains a vast addition to her dominions, and consequently additional space for the population of her enlarged domicile. There is now no want of store house room, nor of employment, for our indefatigable labourers. And while the subjects are employed in collecting, and preparing their various materials, the Queen is engaged in carrying on the great, first principle of nature—the propagation of her species. This she does in the middle box, re-filling with her eggs the cells which have been vacated by the young larvæ. When, however, her next new progeny are about to be brought into life, the Bee-master must draw out the other tin-slide, and thereby open a communication to the other empty apartment, and so make a further addition to the Queen's realm; which the new, and even veteran labourers, will presently occupy, and set about improving and enriching their again enlarged commonwealth. No sooner have the Bees finished their operations in the several compartments of their box-hive, which may be ascertained by looking through the little windows at the back and ends of the boxes, than the Bee-master generally puts in the tin-slide, lifts up the lid of the octagon-box or cover, and takes off the bell-glass, filled with the purest honey. Before, however, he endeavours to take away the glass, it is necessary that he should cut through between the bell-glass and the box, with a fine wire, in order that the tin may the more easily slide under the full glass of honey; when this is done, he may take off the full glass and replace it with an empty one.

The operation of taking off a glass, or a box, of honey, may be best performed in the middle of a fine, sunny day; and in taking off a glass, the operator, having put in the tin-slide, should wait a few minutes, to see whether the Bees made prisoners in the glass manifest any symptoms of uneasiness; because, if they do not, it may be concluded that the Queen-bee is amongst them; and in that case it is advisable to withdraw the slide and to re-commence the operation another day. But if, as it generally happens, the prisoners in the glass should run about in confusion and restlessness, and manifest signs of great uneasiness, *then* the operator may conclude that all is right, and, having taken off the octagon-cover, may envelope the glass in a silk handkerchief, or dark cloth, so as to exclude the light, remove it with a steady hand, and place it on one side, or so that the Bees may have egress from it, in some shady place, ten or fifteen yards from the boxes, and the Bees that were imprisoned in it will in a few minutes effect their escape, and return with eagerness to the pavilion and their comrades.

Previously to removing a collateral-box it will be necessary to examine minutely the state of the boxes, particularly when the whole of your colony is full of the Bees' works. When the tin is put down to divide an end-box from the mother-hive, you, no doubt, make many

prisoners; to prevent which, the night before separating an end-box, from a middle one, lay open the ventilator, which will not only lower the heat of the box, but will admit the atmospheric air, which naturally causes the Bees to leave that apartment, and to retire into the middle box—their native climate; when this is done, you may put down the tin-slide as already directed, and let your Bees remain fifteen or twenty minutes in total darkness: then open the windows of the box you are about to take off, and if the Queen-bee is not within that box, the Bees that are in it will show a great desire to be liberated from their disagreeable confinement, by running about in the most hurried, agitated, and restless manner. But should the Queen-bee be there, you will then find the Bees show no desire to leave her;—the commotion will appear in the middle-box. Under such circumstances, which sometimes happen, you must act with caution; for were you to open the egress from the box to permit their departure, very shortly would the whole of the working Bees join their sovereign in the box you intended to take; and this would be a great disappointment and a complete puzzle to the Bee-master, not thoroughly acquainted with the practice, or proper mode of managing, his valuable hive.

When, however, you do find the Queen in the box you are about to take off, it is easy to draw the tin-side up again, and that done, the Queen-bee will readily embrace the opportunity of leaving the place of her confinement; and then, having put down the dividing-tin, you will presently be in a situation to accomplish your object. You will soon see the Bees running to and fro upon the windows in the box you are about to take off, and when you thus find them anxious to leave your box of honey, close the windows, and you have then only to open an egress by withdrawing the tin; the Bees finding an aperture, with light to direct their departure, will immediately embrace the opportunity of regaining their liberty, will fly away from their prison, and join their fellow-labourers at the entrance of the mother-hive. In a few minutes you will be in possession of a box of honey, and all your Bees will be in safety. Take from them the box your humanity entitles you to, minding that the tin-slide is safe to the middle-box. You will then empty the full box, and return it empty to its former place; then draw up your tin, and you again enlarge their domicil, having gained a rich reward for your operation, at the expense of their labour. A child of twelve years of age may be taught to do this without the least danger; there need no Bee-dresses,—there needs no fumigation of any sort. It is a natural movement for the welfare of these worthies, that prevents their swarming, and at once secures to the sovereign Queen of Bees her rightful throne. Reader, this declaration is founded on facts,—on the practical experience of many years.

[Mr. Nutt's attention was first called to the subject of Ventilation by observing a honey-comb suspended beneath the pedestal of a hive.]

There are few persons, says Mr. Nutt, who are managers of Honey-Bees under the old hive system, who, if they have not seen a comb constructed and suspended in this manner have not, however, beheld

these little creatures, when oppressed with the internal heat of their crowded domicil, and straightened for want of room in it, unhappily clustering and hanging at the door, or from and under the floor-board of their hive, in a ball frequently as large as a man's head, and sometimes covering all the front of the hive, for sixteen or twenty days together; and this, be it remarked, at the season of the year which is the most profitable for their labours in the fields and among the flowers. During this distress of the Bees their labours are of necessity suspended,—their gathering of honey ceases,—ceases too at the very time that that saccharine substance is most plentifully secreted by the vegetable world. And—why? Because they want an enlargement of their domicil,—an extension of the dominion, or (if it may be termed) of the territory of the Queen; by which enlargement swarming is superseded, and the Royal Insect relieved from the necessity of abdicating her throne, retains it, continues and extends the propagation of her species, and of course increases the busy labours of her innumerable subjects. *This accommodation is provided for Bees in my collateral-boxes.*

Without the thermometer we cannot ascertain with any degree of accuracy the interior temperature of the hive; the knowledge of which temperature is of the utmost consequence in the humane management of Honey-Bees. The thermometer is the safest, if not the sole guide to a scientific knowledge of their state and works. To ventilate an apiary or colony of Bees, when their interior temperature is under 60 degrees, would be ruinous to them,—because contrary to the prosperous progress of their natural labours. From upwards of fifteen hundred observations in the summer of 1825, I am fully satisfied on this point. Their nature is to keep up at least that, and sometimes a much higher, degree of temperature by their indefatigable labours; and as the temperature of the hive rises, so does it invigorate and encourage an increase of population, as well as an increase of their produce. As the hive fills, so will the thermometer rise to 120 and even to 130 degrees, before the bees will by over-heat be forced to leave their wealthy home. When the thermometer is at the above height, the colonists will have arrived at the highest state of perfection,—every store-house being filled nearly to suffocation with their abundant treasures, and they, as it were, petitioning the observer of their too-limited store-house for a fresh room. Thus circumstanced then give them a fresh room,—accommodate them with such a store-house as either of my collateral-boxes will, and is intended, to afford them. *Force them not to swarm*: an emigration from a prosperous colony of half its population cannot fail of being very disadvantageous, both to those that emigrate, who must necessarily be poor, and to those that remain, be they ever so industrious, or ever so wealthy.

When you discover the thermometer rising rapidly, and, instead of standing, as it generally does in a well-stocked colony, at about 80 degrees, rising in a few hours to 90, and perhaps to 96, or even to 100, you may conclude that ventilation is *then* highly necessary. The more you ventilate, when the temperature gets to this oppressive and

dargerous height, the more you benefit the Bees labouring under it; for when they find a comfortable temperature within, they enjoy it, and will proceed to fill every vacant comb.

To prove the utility of ventilation and of the thermometer, in regulating the degree of ventilation in the management of Bees, I will now give my reader an account of some interesting experiments that I made in 1826, and then add a few extracts from my thermometrical journal of that summer, which in fact guided me in those experiments, for without the assistance of my thermometer I could not have made them; from which, taken together, it will, I think, be sufficiently evident that ventilation and the thermometer are highly necessary,—are alike important,—in short, are *indispensable* in the humane management of Honey-bees.

On the 26th of June 1826, I suffered a colony of Bees to swarm, in order to prove the truth of the foregoing statements. It was a very fine colony: the thermometer had been standing at 110 for six days previously, in one of the collateral boxes; on the eighth day it rose suddenly to 120. I was then forcing my Bees to leave their home; I could have lowered their temperature, and by so doing, I could have retained the Bees in their native boxes: but I was then about to prove a fact of the greatest moment to apiarians. On the ninth day, at half-past twelve o'clock, the finest swarm I ever beheld towered above my head, and literally darkened the atmosphere in the front of my apiary. After remaining about five minutes in the open air, the Queen perched herself upon a tree in my garden, where she was exposed to the rays of a scorching sun; but her loyal subjects quickly surrounded her, and screened her from its influence. I immediately did what I could to assist my grand prize, by hanging a sheet before it, to ward off the intense heat of the sun. I allowed the Bees to hang in this situation until the evening. During the absence of the swarm from the colony, my full employment was to watch the parent-stock, in order that I might, in the evening, return the Bees of this beautiful swarm to their native hive, which they had been forced to leave. Curiosity and a desire to solve a doubtful problem, for the good of future apiarians, led me to act as already related, at the expense of much inconvenience to the Bees. The remaining Honey-Bees continued labouring during the remainder of the day; and in the evening of that same day, the thermometer was standing at 90 degrees in the old stock; so that the absence of the swarm had lowered the temperature of the pavilion 30 degrees, and I was quite sure I could reduce it in the collateral box to that of the exterior atmosphere, which, after the sun had gone down, was only 65.

To effect this, I resolved at once to take off a fine top-glass filled with honey. I did so: its weight was fourteen pounds. This operation reduced the interior heat of the colony to 75. But looking at my grand swarm, and intent as I was upon re-uniting it to the parent-stock, I thought it impossible for the vacant space conveniently to hold all the Bees. I had one, and only one, alternative left,—and that was to take

from my colony a collateral-box. I therefore took it; and a most beautiful box it was: its weight was fifty pounds. I immediately placed an empty box in the situation the full one had occupied. I then drew from the side of the pavilion the dividing tin-slide, and the whole of the colony was shortly at the desired temperature of 65, that being the exterior heat of the evening. I was now fully convinced of the propriety of returning the swarm. I commenced operations for accomplishing that object at ten o'clock in the evening, by constructing a temporary stage near the mouth of the parent-stock. I then procured a white sheet, and laid it upon the table or temporary stage, and in a moment struck the swarm from the hive into which the Bees had been taken from the bough in the evening. My next difficulty was to imprison the sovereign of the swarm; but with a little labour I succeeded in discovering her, and made her my captive. No sooner was she my prisoner than the Bees seemed to be acquainted with her absence. But so near were they placed to the mouth of the parent-stock that they soon caught the odour of the hive, and in the space of about fifteen minutes the whole swarm, save only her majesty, were under the roof of their parent-home. The following morning increased my anxiety about the welfare of my stock. Fearful lest my curious anticipations should meet with a disappointment, at sun-rise I released from her imprisonment the captive Queen. I placed her on the front-board, near the entrance of her hive, to ascertain, if possible, whether there was within the state one greater than herself. But no visible sign of such being the case presented itself. The influence of the cheery sun soon caused her to move towards the entrance of the native domicil, where she was met, surrounded, and no doubt welcomed, by thousands of her subjects, who soon conducted her into the hive, and, it may be presumed, re-instated her on the throne, which a few hours before she had been compelled to abdicate. The Bees afterwards sallied forth with extraordinary alacrity and regularity, and, beyond my most sanguine expectations, filled a large glass with honey in the short space of six days.

I have now to remark, that during the nine days after the swarm had been returned to the parent-stock, the themometer continued rising until it reached the temperature of 90 within the collateral box; and on the tenth day, at five o'clock in the morning, I witnessed the grand secret,—I viewed with unutterable delight the extraordinary fact I had been endeavouring to ascertain,—viz.—*two royal nymphs laid prostrate on the alighting-board*, near the exterior entrance of the hive. This circumstance alone convinced me that no more swarming was necessary. I have further to notice, that on the third day afterwards the Bees commenced their destruction of the drones,—which was a satisfactory proof that I had gained my point. That colony has never swarmed since the period I thus first satisfactorily established the utility of ventilation.

The following is a summary of memorandums of the several deprivations or takings of honey from one set of boxes in 1826:

May 27.	Glass and box	54	lbs.
June 9.	Box	56	..
——10.	Glass	14½	..
——12.	Box	60	..
——13.	Ditto	52	..
Collateral-box		60	..
		296½	lbs.

By regulating the interior temperature of the hive, suitable and generative heat is confined to the pavilion, that is—to the mother-hive, which heat causes the Queen to propagate her young in the pavilion—this being the middle-box, and having the entrance, a great advantage is thereby afforded to all the Bees passing in and out, that fully demonstrates the necessity of their labours being assisted in the breeding-season, *and not obstructed*.

It is the heat which causes the working Bees to deposit their pollen in the immediate vicinity of the middle box. This pollen, which is called by some writers Bee-bread, is gathered and deposited for the special purpose of supporting the young larvæ, while helpless insects, as it were, in the hive. Combined with heat, it is this material which discolours the much admired works of the Bees; it is this which also makes the wax and honey yellow: besides where this pollen is deposited by the Bees, there, or in that part of the hive, will the Queen lay her eggs,—and there of course propagate her species. And as animal nature advances to perfection, so rises the interior temperature of the hive, until an almost suffocating heat obliges the Bees to leave their home. This heat extends itself to the most remote parts of their domicil; and were it not for the influence of ventilation in the end-boxes, a discolouration of their beautiful works would also be extended through the hive, and the Queen would lay her eggs promiscuously as she does in the cottage-hive. But this mischief is corrected by ventilation: can then any reasonable man deny its powerful and useful effects in the management of Bees?

The Queen-Bee is but seldom seen by the most acute observer; she loves to propagate her young in secresy, at the regular temperature of the hive at her own birth. If she can possibly avoid it, she will not lay her eggs where man can overlook and examine her movements; consequently the ventilation in the side-boxes prevents her extending her works of nature beyond the limits of her native hive. As soon as she feels a cooling change of temperature, she immediately withdraws to her native clime, and leaves her working subjects to store the beautifully white combs with honey.

Under certain circumstances it will always be necessary, and judicious in Bee-masters, to have recourse to *feeding*. If, for instance, after an early swarm is put into a hive, or into a box, two or three or more cold, ungenial days should follow, and more particularly if those days should happen to be rainy also, by feeding such a swarm you will assist

your impoverished labourers, not only with *requisite food*, but with materials and treasure, which, unfortunately for them, they cannot at such an unfavourable juncture get abroad to collect elsewhere. *By judicious feeding, at proper seasons, almost any stock of Bees may be preserved: by injudicious feeding*, at an improper season, even good stocks —stocks that would survive, if not fed at all, nor molested, during the depth and severity of winter, may be seriously injured—may be totally destroyed. The peasant Bee-keeper, however, does not often subject himself to the charge *complimental* of being accessary to the death of his Bees *through mistaken kindness*. The sum and substance of my directions, as respects Bee-feeding, are these :—

1. In spring feed *sparingly*.
2. In autumn feed *plentifully*.
3. In winter *do not feed at all*.
4. Feed swarms, if unseasonable weather immediately follow the act of swarming.
5. Preserve the Bees of weak stocks, and prevent a great deal of the necessity for feeding, by adding them to those that are rich and able to support them. This last is the best and cheapest, nay—it is even a *profitable* method of feeding Bees.

Early swarming, where swarming is necessary as in the straw-hive colonies, is of great advantage to the watchful apiarian, but not to the inattentive and slothful manager. I have seen in a cottager's garden a swarm of Bees on the 10th of May, which was considerably weaker in the month of August, than was a swarm on the 10th of July, and that solely on account of not being fed and properly attended to.

If early swarms are judiciously fed, and supported by a natural heat within, they will be greatly benefitted thereby, and eventually prosper.

Artificial food proper for Bees may be made by mixing *coarse* raw sugar, and good sound ale, in the following proportions :—

To a quart of ale add a pound and a half of sugar, gently boil them, in a sweet, well-tinned saucepan, over a fire clear from smoke, for five or six minutes, or until the sugar be dissolved and thoroughly incorporated with the ale; and, during the process of boiling, skim off the dross that rises to the surface. Some persons boil these ingredients much longer, and until they become, when cool, a thick, clammy syrup; this not only diminishes the quantity of the mixture, but renders it rather disadvantageous, to weak Bees in particular, by clogging and plaguing them, if, as they are almost sure to do, they get their legs or wings daubed with it. I prefer syrup in a more liquid state.

For spring feeding, I advise—that not more than a pound of sugar be put to a quart of ale, or sweet wort, if it can be obtained, and that a small quantity of common salt be added. By a *small quantity* I mean —a drachm or two at the most to a quart of the syrup. Salt, it has been said, is conducive to the health of Bees, and the most efficacious remedy for the dysentery, which sometimes affects Bees in the spring; therefore, it may not be amiss to put a little salt into their food, by way of preventive, rather than to have recourse to it afterwards as a remedy.

The following detail will show my readers the results of some experiments, relative to the aspect and situation of Bee-hives during winter; and whilst in some degree they corroborate the foregoing observations, they may perhaps induce those, who are anxious for the prosperity of their Bees, to submit to be taught a useful lesson respecting the winter management of them.

In 1824 I had six cottage-hives, which had prospered well with me during the summer of that year. In the autumn of the same year I resolved to weigh those six hives, and to place three of them on the north side of my house, and to let the other three remain in their summer situation. The separate weights of my hives, in November of the year 1824, were as under, viz.

No. 1.	35 lbs.	No. 4.	42 lbs.
2.	38 —	5.	32 —
3.	40 —	6.	37 —
	113		111

The first three of these Nos. viz. 1, 2, and 3, weighing together 113 lbs. remained during the winter in their summer situation: Nos. 4, 5, and 6, weighing together 111 lbs. were removed to a cold dry place, on the north side of my house. On the 26th of March, 1825, I again weighed those six hives, and found their respective weights to be as follows, viz.

No. 1.	15 lbs.	No. 4.	37 lbs.
2.	16 —	5.	27 —
3.	19 —	6.	32 —
	50		96

So that the three hives, remaining in their summer quarters during the winter, had decreased in weight just 63 lbs., being on an average 21 lbs. each, while the three which had wintered on the north side of my house had decreased only 15 lbs., being on an average only 5 lbs. each. This gives an average difference of 16 lbs. a hive, between a proper and an improper winter situation and aspect for Bees. It is lamentable to think how many people lose their Bees, either from ignorance, prejudice, or want of attention to this particular point—*a proper winter situation.*

I need scarcely relate to my readers, that the Bees which were placed fronting, or open to the north, were the first that swarmed the next spring. They swarmed in the month of May; while those hives that had remained fronting, or open to the south, did not swarm until July; and one hive (No. 2.) never swarmed at all during the season. At the latter end of October, 1825, I again weighed my hives, and found them to be as under:—

No. 1....	28 lbs.	Swarm from ditto	10 lbs.
2....	22 —		
3....	30 —	Swarm from ditto	14 —
	80		24

No. 4....44 lbs.	Swarm from ditto	32 lbs.
5....43 —	Swarm from ditto	28 —
6....41 —	Swarm from ditto	30 —
128		90

Hence it appears that the three hives (Nos. 1, 2, and 3) that had never been removed from their summer stands, were 33 lbs. lighter than when I first weighed them, that is, on an average, 11 lbs. a hive; and even with the weight of their two swarms added to them, there was a falling off in the year of 9 lbs. or, on an average, of 3 lbs. a hive: whilst Nos. 4, 5, and 6, had gained 17 lbs. or, on an average, nearly 6 lbs. each; and with the weight of their swarms added to them, they had gained 107 lbs. or, on an average, nearly 36 lbs. a hive in the year.

I could carry this subject much further in my explanations, as I did in my experiments, but it requires no facts in addition to those just stated to explain the difference of aspect in the winter-season to Bees.

Mr. Nutt concludes his highly interesting and useful treatise with a few miscellaneous directions, chiefly recapitulatory, which, on account of their importance, every apiarian should constantly bear in mind.

Have your Bee-boxes *well made,* and *of good substantial materials.* Strength and durability are of greater consequence than neatness, though that need not be neglected—neatness and strength are not incompatible—they may be combined.

Paint your boxes annually, when they are in their winter-situation.

Make a clear ground or floor-way from the pavilion into each of the end-boxes, by cutting away about two inches from the lower edge of each of the corresponding ends, to the depth of half an inch; and make this way or passage as near the front entrance as it conveniently may be. This conveience has been suggested to me *since* the directions for making collateral-boxes were printed, and I therefore mention it here as an improvement, because such a way on the floor, and *without any climbing,* will afford an additional accommodation to Bees on many occasions.

Situation is of prime importance: for summer it should be clear and open in front of your boxes, and sheltered at their back by a north-wall or by a thick hedge.

In summer let their aspect be south-east:—early in spring, and again in autumn, due south is the best point to be in front; therefore, as spring advances turn the front of your boxes eastward, and as summer declines move them back again to their spring aspect; or, in other words, when there is not more than twelve hours' sun, let the front of your boxes be due south; and during the time that the sun is more than twelve hours above the horizon, let it be south-east.

Always have the cheerful rays of the morning sun fall upon your boxes; but contrive to throw a shade upon their front for a few hours in the middle of the day, when the weather is very hot. Such a shade will be grateful to your Bees.

Elevate your boxes twenty inches or two feet above the ground; and always keep the grass or ground, under and near them, neat and clean, and entirely free from all nuisances.

A constant supply of water in the immediate vicinity of your apiary is highly desirable; if therefore you have not a natural supply of that element, *so necessary for Bees*, contrive to let them have it by artificial means—by placing it in or near your apiary, in large, shallow dishes, or in wooden troughs, partially covering the surface with reed or moss, and be careful to replenish them, so that your Bees may always find it there.

Suffer not ants to burrow near your Bees. Ants are enemies to Bees, and will annoy them, if they get among them.

Spiders also are Bee-destroyers; therefore, brush away their entangling webs, whenever and wherever you find them about your boxes.

Fowls should not be permitted in an apiary.

Early in spring let the entrance be not more than an inch, and increase it gradually to its full extent, as you find occasion: contract it again towards the fall of the year; and, if the moths be troublesome in summer evenings, nearly close it every evening; but take care to open it again either early next morning, or as soon as the evening flight of the moths is over. This attention is more particularly due to weak stocks, and affords them great protection against the attacks of moths, which are among the boldest, the most persevering, and, when once they have got into a hive, most destructive enemies to Bees.

Destroy wasps and wasps' nests wherever you find them in the vicinity of your apiary. The destruction of queen-wasps in spring is the most effectual method of diminishing the number of these formidable Bee-enemies; because the destruction of a queen-wasp in spring is tantamount to the destruction of a whole nest afterwards.

Light in the domicil of Bees, if not actually prejudicial to them, is, at any rate, displeasing to them; therefore, be careful never to expose the Bees unnecessarily to its glare; never leave the window-doors open, nor suffer careless visitors to do so.

Ventilate your collateral-boxes and bell-glasses, when the interior temperature is at, or above 70 degrees.

Never irritate your Bees, nor offer any sort of violence or opposition to them; and should an angry Bee or two at any time attack you, walk quietly away, and leave them to settle into peace again.

On no account drive your Bees; it is a ruinous practice. With boxes, however, I trust, it is impracticable, and totally superseded.

Never disturb, nor in any way interfere with, the middle box.

On no account destroy any of your Bees: independently of its cruelty, it is an impolitic practice; it is like cutting down a tree to get at its fruit, which may easily be gathered by less laborious and indestructive means. Encourage your Bees,—accommodate them,—support them,—and *by all means preserve them*; and, when seasons are favourable, they will *richly* reward you for your attention to them.

Always keep a cottage-hive, or single box or two, in your apiary, for

he purpose of having swarms from them, with which to stock empty boxes, or to strengthen such stocks as may stand in need of additional numbers.

Never impoverish your Bees by taking from them more honey than they have to spare. Always suffer them to be in possession of a plentiful store. Over-deprivation distresses them, and is no gain to the proprietor. Among other reasons this is one for my repeated directions—not to touch the middle-box.

Honey of the very finest quality may commonly be obtained from collateral-boxes, as early in the season as the months of May and June, without injuring the parent-stock in the slighest degree. The enlargement of their domicil by returning an empty glass, or an empty box, to the place from which a full one has been taken, is at this busy period of their labour an accommodation to Bees, and is one great means of preventing the necessity for their swarming, as it enables them to continue their work at the time that there is the greatest abundance of treasure for them in the fields, and when Bees in cottage-hives cannot profit by it, owing to their want, not of inclination to gather it, but of room in their hive to store it; they therefore swarm once, twice, perhaps three times. What then can be afterwards expected from such exhausted stocks but weakness and poverty? The more numerous the working Bees are in any colony, the more honey they will collect, *provided thay have room wherein to store it.* Accomodate them, then, with convenient store rooms, and the more workers you have in your boxes the better. Up to the middle of August you may, with safety, that is, without injury to the Bees, take off glasses and boxes, as they become ready. *After that time* it is advisable to have, and to leave, in every colony, honey sufficient for the subsistence of the Bees until next spring; and should you take off a full box, later in the season than the middle of August, instead of emptying it of all its treasure, be content with a part of it,—take a part, and *return a part—share it with the Bees, and let their share be a liberal one.* As has been already enjoined—*on no account impoverish them by over-deprivation,* at that precarious season especially. They possibly may collect much honey after that time; if so, share with them again; if not, have them rich from your first bounty.

When a box, well-stored with honey, is taken off, it is not an easy matter to extract the first comb or two, without breaking them and spoiling their beauty, besides shedding more or less of the honey; therefore, be prepared with proper knives. Any common knife that has a blade long enough, may serve to sever the combs from the sides of a box; but, to cut them from the top, it is advisable to have an instrument, which may be called a Bee-knife, of the following construction:—a two-edged, lancet-shaped blade, two inches long and three-eighths of an inch broad, having the hole, through which the rivet would pass to fix it in a haft, drilled large enough to admit the end of a steel rod, upon which it is to be well brazed or rivetted; the other end of this rod may be finished with a neat handle, leaving its

clear length between the blade and the handle eleven inches—that being rather more than the depth of my Bee-boxes. A knife of this description may easily be passed between the combs, and is very convenient for cutting them from the top of a box.

Whenever you have occasion to perform any operation among your Bees, be provided with every requisite material, implement, &c. Have not any thing to seek for, much less to get made, at the moment it is wanted; *that moment may perhaps be a critical one.*

In September unite the Bees of poor stocks to rich ones; and now, or in March, transfer stocks from straw-hives into boxes.

Previously to withdrawing the tin-divider, for the purpose of opening the communication into an end-box, take off the end-box and dress the inside with a little liquid honey; this will bring the Bees into it, when, but for the honey, they would perhaps refuse to enter it; and at that time close the ventilation. It is wrong to ventilate empty boxes, because it drives the Bees into the pavilion; and it is a fact, that they will swarm from the pavilion, rather than take possession of an empty end-box, if its temperature be, and be kept, disagreeably cold, by having the ventilation open at the very time it should be carefully closed. This will both explain and remedy the difficulty, that some aparians complain of having experienced, in getting their Bees to take possession of an empty-box; it will also account for swarms sometimes leaving the pavilion when there is no want of room; the fact is—that the temperature of *that room* is not agreeable to them; but it is owing to the mismanagement of the apiator that it is otherwise than agreeable.

Whenever a box is taken off, be careful to open the perforations in the cylinder ventilator, many of which will be found sealed up with propolis. These perforations may be cleared at any time, by introducing a piece of wire with a sharpened point, turned so as to pick out the propolis; but they are most effectually opened when a box is off.

Towards the latter end of November, or earlier, if the weather be inclement and severe, remove your Bee-boxes to their winter situation; this should be *dry, quiet, cool,* and *dark,* and place your boxes in it so that they may front towards the north or north-east.

Guard and close the entrance with a piece of fine wire-cloth, of Lariviere's patent tin, or of perforated zinc, (which is the best on account of its not corroding) made fast to the box, either of which will confine the Bees within their domicil, admit plenty of fresh air, and keep out inimical intruders. Thus prepared for winter, having every tin and block in its proper place, *disturb your Bees as little as possible.*

Towards the end of February, or as soon as vegetation begins to make its appearance, take your boxes from their winter to their summer stands, and commence another course of attentions, observations, and humane management, similar to that herein directed and explained. And, though cases may arise, and difficulties occur in the course of your practice, for the remedying of which no specific directions are, or

can be, here given, your own experience and progressive improvement in the pleasing science of Bee-management, will lead you to adopt the proper mode of treating the former, and the proper means for surmounting the latter.

The above is an outline of Mr. Nutt's excellent system of Bee-management, but those who may be desirous to profit by Mr. Nutt's instructions, must have recourse to the work itself, which we are pleased to find has already reached a second edition.

WINE MAKING.

FROM A TREATISE ON BRITISH WINES BY MR. W. H. ROBERTS.

This treatise has been justly characterized as being at once the most practical and scientific that has hitherto been published. The great improvements the author has made in the manufacture of British Wines, obtained for him the medals of the Caledonian Horticultural Society. In the extracts which we have made, it will be seen that Mr. Roberts's practice is based upon scientific principles, and we are convinced that those who adhere to our author's instructions, will be secured against those disappointments, which so frequently attend the vague and imperfect directions put forth by almost every other writer on this subject.

One of the principal objects of this treatise, says Mr. Roberts, is to lay down a simple method to guide the operator in judging of the value of his fruit, as well as that of his sugar, to enable him to conduct the process with comparative ease and satisfaction to himself, and to secure a favourable result. The chief object which he ought to have in view, is to convert the sugar of the fruit, and the sugar in a pure state, which he must necessarily introduce to bring the *must* up to a proper standard, into spirit, whatever the quantity which he means to manufacture may be. The nature of this conversion, and the circumstances attending it, form one of the most obscure departments of chemistry. That this decomposition, namely, the converting of the saccharine matter into spirit, is going on, can only be ascertained by the saccharometer, which will show the gradual progress of the attenuation through fermentation. This instrument also shows the specific gravity both of the pure juice, and the juice and water, as well as of the compound of juice, water, and sugar. To accomplish this end, portions of the *must* or compound must be taken out daily to be weighed by the instrument. I would strongly recommend those of my readers who are wine-makers, and who are really desirous to excel in this art, to record the results of their daily examinations in a book kept for the purpose, that these may serve as guides to them in their future operations. It must be obvious to every reflecting mind, that without a knowledge of the fermentable matter one has to work upon, all attempts to obtain uniformity of wine must be unavailing. The sacccharometer, with the method of using it, I will afterwards describe.

I have used it upwards of twelve years, and without its aid I never could have made wine of any description. I use it, first, for finding

the specific gravity of pure juice; secondly, of the pure juice with water; and, thirdly, of the compound of juice, water, and sugar, bringing the *must* up to the intended standard. Thus, having a compass to steer by, I add to or decrease the quantity of sugar or pure juice necessary for compounding every year a *must* of the same quality.

The pure juice of the currant in a dry warm season, when the fruit is grown in a well cultivated garden, and when dead ripe, will raise the instrument to 60. However, it varies a little from 50 to 60. In a cold wet season the juice of the fruit, from the very same bushes, will not raise the instrument above 40, and sometimes not above 35.

Such gravities as the latter, without the assistance of sugar, will be greatly insufficient to make a fermented liquor, except of a very meagre quality. Some people who have not sufficiently considered the subject have asserted, that sugar is unnecessary in the composition of domestic wine, providing pure juice is used. I was myself formerly inclined to favour this opinion; but have discovered, from the failure of many experiments, that it is absurdly erroneous, a mere chimera indeed; and the result has convinced me, that the more sugar that is used, providing it do not exceed 3½ lbs. to each gallon of the juice, the more generous will the wine be, and the longer will it keep, provided the attenuation be complete, which I repeat is impracticable where the quantity made is small. The more sugar that is employed, the less water it is necessary to add to the juice; for the essential ingredient, that is, natural leaven or yeast, is held in solution in the juice, by the help of which the sugar can alone be converted into spirit without artificial means—a means which should never be resorted to unless in extreme cases. By putting too much water into the juice you deteriorate the leaven, the consequence of which will be, that much of the sugar will remain in an unaltered state, giving rise to a wine disagreeably sweet, sickly, and without sprightliness, and completely destitute of that vinous character which it ought to possess. Hence much of the prejudice entertained against home-made wine is not without foundation.

The inference that we ought to draw from these circumstances is, that there should be some precedent to direct us regarding our standard gravity. I have found from experience, that in order to make a strong, generous wine, a *must* should not be under 115, although 120 is better, excepting for champagne, when 105 to 110 will be quite sufficient. Taking it for granted that the standard is 120, and that the fruit in a good year will give on the average a gravity of 55, the deficiency then will be 65. This deficiency must be made up by sugar to 120 the standard. In a bad year the fruit will not yield what it did in the good one, as before noticed. The deficiency of gravity will be greater, which the instrument will indicate. The pure juice must then be more and the water less, when water is used, which is always advisable; and besides, more sugar will be necessary to bring the *must* to the standard 120.

The common rule for making wine is, to use a greater weight of water than of fruit. My rule is, to put, on the average, equal measures of juice and water. This, perhaps, in a very favourable season, may be a little too much, especially if the quantity intended to be made is great. One-third juice and two-thirds water will perhaps be a good proportion, especially if the wine is to be soon used. This alone must depend upon the quality of the juice. It is, however, always best to err on the safe side, for the stronger the juice is the better will be the fermentation. Let us suppose, then, that in a good season, we find, on examination, the pure juice to be 60, or any number under; by putting an equal portion of water as juice, the liquid will be reduced to 30. Let us fix, then, upon this weight 30 as our standard, whether the season be favourable or the reverse. In a good year equal portions of pure juice and water will produce this gravity. In a bad one, the pure juice will probably admit of only one-third water. In this last mentioned season, we may find by the instrument that the pure juice yields only 40 instead of 60; consequently, by adding the same measure of water as juice, we shall only get 20 instead of 30, making a deficiency of 10. This deficiency must be made up (after the discovery in the pure juice), by adding a greater proportion of pure juice to the water until it rises to the proposed gravity 30, keeping always in mind, that the less gravity and quantity of pure juice our fruit yields, the less fermentable extract, *i.e.* natural leaven, we shall have to carry on our fermentation. Sugar and water, it should be premised, will not spontaneously ferment without a proportion of that necessary leaven, which is held in solution in the juice of the fruit, or without using artificial means, such as brewer's yeast, or some other vegetable extract. By the saccharometer, we are taught the value of the juice. We have now to apply it, in order to ascertain the value of the compound of pure juice, water, and sugar. Every pound of good Jamaica sugar, mixed with one gallon of water, when thoroughly dissolved, should give a gravity of from 35 to 36½. We will assume here that the gravity is only 35. Now, as we require 90 to make up a *must* to the standard gravity of 120, it will require rather more than 2½ lbs. of sugar to each gallon of *must*; for by using only 2 lbs. to the gallon we shall get two thirty-fives, equal to 70, instead of 90 minus 20. By the addition of another half pound of sugar to each gallon we shall raise the 70 to 87½, being 2½ less than is required. A small portion of sugar may or may not be added at pleasure. The saccharometer will of course be our guide in the obscure process of fermentation; for in proportion as the sweet or saccharine matter lessens, the liqueur becomes more vinous and spirituous, and therefore decreases in gravity. This instrument will clearly demonstrate the progressive decline of the *must* until it is reduced to the desired point of attenuation. By regulating our fermentation by this instrument, the practice of adding spirits to our domestic wines, especially to the extent which is now practised (these being erroneously supposed to preserve or improve them), will be found quite unne-

cessary, as it is a well-ascertained fact, that the durability of wines is shortened by the addition of spirits, as spirits decompose and displace the carbonic acid, and prevent the wines being lively and brisk, which should be the character of home-made wine. Some add spirits for the purpose of checking fermentation, or preventing the wine from turning sour. That spirits will not prevent wine running into the acetous fermentation, unless used in very considerable quantities, has been fully ascertained. We now see that spirits are of no use to the wine for checking fermentation; and we must own, that the addition of it to that wine which has in itself perhaps too much already, will prove injurious to the constitution of the consumer, as well as an expensive ingredient in the manufacture. Would those who make wine, and think it will not be good without the addition of spirits, give their *must* a small increase of juice and sugar, reducing those extra allowances with skill and attention, and taking the saccharometer for their guide, they would, I am sure, be convinced that the general and prevailing use of spirits in wine, in any stage of the process, is unnecessary, unwholesome, and expensive.

Champagne, grape, and raisin wines, have been more fully discussed than many others. The reason is, that these enjoy a more unexceptionable popularity than any other home-made wines. This arises, in the first place, from their approaching in flavour, bouquet, and appearance, more nearly than the others to foreign wines; and secondly, because they are more frequently met with at table. Perhaps another reason may be found in their really being in the abstract of superior quality. I have borrowed from Dr. Shannan the French method of treating their wine:—" After the grape has been pressed and converted into a vinous liquor, the operator ought to follow, as nearly as circumstances will allow, the continental method of treatment; for the more nearly he attains to this method, the more nearly will his wine approach in every respect to the continental wine he intends to imitate." Regarding the treatment of the unripe grape used for Champagne, I have adopted Dr. Macculloch's scientific method, which, with the aid of the saccharometer, will enable the artist to produce a wine of very superior quality, excelling four-fifths of that which is sold in this country for eighty-four shillings per dozen. To supply the deficiency of sugar in our native fruits, I have found *wort* from malt more beneficial and economical than any other basis, especially when beer is made from the good yet remaining in the malt, after a sufficient quantity of *wort* has been extracted for the making of the wine. The first running of the mash is richer, and contains much less mucilage than the second. In fact, it is only the first running that is fit for the wine; consequently, after you have obtained all the extract which this first running gives, much fermentable matter still remains —invariably to the extent of about one-half. This is capable of making most excellent beer, equal to that sold in Edinburgh for two shillings and sixpence per dozen. A weak extract of malt wort, brought up by sugar to the gravity of 110, is still a better, but a more expen-

sive basis than the former; but even by this method a saving of 20 per cent. is made; and wine which has been manufactured with either of these foundations, if consistently fermented, will possess more softness of flavour and spirituosity, than wine whose basis is composed of sugar alone; for the mucilage contained in the *must* will induce a steady and uninterrupted fermentation. A bushel of good malt is as valuable to the maker of wine and beer as 23 or 24 lbs. of the best Jamaica sugar. Good malt is generally about 7s. or 8s. a-bushel, sugar from 6d. to 7d. per lb.; there is therefore a saving of upwards of 40 per cent. in using malt. Malaga rasins is another basis, which may be employed with great advantage—a basis from which all manufacturers of home-made wines for sale obtain their saccharine matter, as well as those who adulterate foreign wine, or imitate it by employing a home-made material as the principal constituent of their compound; and making it resemble the foreign article by an admixture of deleterious ingredients.

It is my opinion, all our domestic wines should be made with a portion of rasins and sugar, or malt and sugar, or a combination of malt, raisins and sugar; the liquor extracted from which will be found not only greatly ameliorated, but the quantity of alcohol increased.

Description and use of the Saccharometer.—Dr. Thomson, who was one of the three individuals selected by government to inquire into the differences in value between the English and Scotch barleys and malts, in his report, has shewn that the instruments in general use are almost all mathematically incorrect; and he has himself accordingly invented one which is made by Alexander Allan of Edinburgh.

The saccharometer invented by Dr. Thomson is so contrived as to show the actual specific gravity of the liquid intended to be valued; and as in all saccharine liquids exceeding the degree of heat of 60, the gravity will be lessened, whilst, on the contrary, if colder than 60°, the weight will be proportionably increased, a thermometer and a sliding rule accompany the instrument, for the purpose of exhibiting the strength of the extract at any required temperature. This is very desirable: for to wait until the extract was cooled down to 60°, (the standard degree of heat), would be very tedious, especially in brewing. To those of my readers who are anxious to excel in wine-making, I would strongly recommend them to purchase this instrument, assuring them it will pay itself in two years, especially if, in addition, they also brew their own ale. I need say no more respecting this instrument, as a book containing every instruction for its use and application is given with it. Those, however, who think three guineas rather too large a sum to expend in this way, may be accommodated with a glass hydrometer, manufactured by Mr. Dun, optician, Edinburgh, and by Mr. Tagliabue, optician, Hatton Garden, London, at the small price of six shillings, which will show the gravity as well as Dr. Thomson's, up to 130, 10 above my proposed standard, only that all liquids under examination must be reduced to 60° of heat. The instrument consists of an egg-shaped ball, balanced below by a small quantity of quick-

silver, and terminating above in a long tube, which contains divisions, from 1 to 26, No. 0. being the weight of water. Each of these divisions show 5 of gravity. Between one division and another there are three degrees marked, each degree showing a certain intermediate gravity; so that by multiplying any number, which, on examination, the liquor cuts, by 5, you will find out the gravity of the wort. For example, should the liquor raise the instrument to 26, the last number on them, by multiplying 26 by 5, it will be 130. Should the liquor raise the instrument only to 8, the 8 multiplied by 5 will be 40; and either of these numbers, 130 or 40, will be the specific gravity.

Specific gravity is the absolute weight of different bodies of the same bulk. A cubic foot has been taken as the standard bulk of substances, of which it is required to ascertain the specific gravity. As a cubic foot of pure water, at the temperature of 60°, weighs nearly 1000 ounces, it is considered to be sufficient for all practical purposes to call it so. When the instrument is put into the cylinder filled with pure water at the temperature of 60°, it will sink to 0 on the glass stem; but when it is put into a liquid containing sugar, or, more properly speaking, holding sugar or any other saccharine substance in solution, it does not sink so low, because such liquid is heavier than water; and as the weight of any extract increases with its strength, it is obvious, that the stronger the extract is (or the greater the quantity of sugar it contains), the less the instrument will sink; and the weaker the extract under examination is, the more it will sink.

Specific gravities.—The following are the specific gravities of pure juice of some of our fruits, taken in favourable years. I have also given the gravity of a pound weight of different samples of raw sugar, honey, and raisins, held in solution by one gallon of water, at the temperature of 60°, in order that the reader may have a compass to steer by, in bringing the gravity to the standard required.

Pure juice of red currants, highest gravity	60
... white do. do.	56
... black do. do.	56
... do do. do.	50
... red do. do.	51
... do. do. do.	45
... apples averages,	46
... pears,	49
... ¾ ripe gooseberry,	36
... ¾ oranges, January,	49
... ¾ lemons,	38
... foreign grapes, brought here in jars, green,	70
... do. do. black,	68
1 lb. good raw sugar dissolved in one gallon of water,	36½
1 lb. do. do. do. 2nd sample	35
1 lb. do. do. do. 3rd sample	30
1 lb. refined do. do. do.	36
1 lb. treacle, do. do.	30
1 lb. Scotch honey,	30½
1 lb. foreign do.	29½
1 lb. of Valentia raisins, in one gallon of water, 21 days,	18½
1 lb. of good Malaga do. do. do.	18

1 lb. of good Malaga raisins in one gallon of water, 21 days	...			...	...	16
1 lb. do.	do.	do.	do.	...	...	15
5 lbs. parsneps, boiled in one gallon of water, for two and a half hours	...	...	...	...	...	15
5 lbs. of beet root do.		do.	do.	...	...	14
1 bushel of good malt, equal from 20 to 24 lbs. of sugar.						

Wine made from unripe Gooseberries in imitation of Champagne.—There is more of this than any other kind of wine made from the fruits of this country, owing to its resemblance to Champagne. And as it appears to be in more general use than any other, it is my intention, not only to give the reader the result of my own experience in its manufacture, but also the experience of others, as well as to lay down the mode which the French adopt in conducting fermentation, racking, sulphuring the casks, and other means necessary for producing this peculiar wine. One of the best methods which I have discovered of manufacturing this wine it will be my object particularly to describe. At the commencement, I use only one part of water and three of berries. An imperial gallon of fruit, when heaped, weighs 10 lbs., but it may be less. To avoid unnecessary calculation, we may as well assume, that an English pint of fruit weighs 1 lb., and that an English pint of water weighs the same. An English pint of water weighs really upwards of 1¼ lb., but this difference is of little consequence, as it is by measure and not by weight that we proportion the fruit and the water. To make a 15 gallon cask of this wine, you will require 22½ gallons of gooseberries, as the fruit does not produce much above one-third of juice; the 22½ gallons of fruit consequently will only produce 7½ gallons of juice. It is always advisable to make a two gallon cask more, for the purpose of supplying the deficiency which will necessarily arise from racking off the large cask, so that, instead of filtering the grounds from the latter, and returning them into it, you will fill it up with fine wine from the small cask; afterwards filter the grounds, and fill up the small cask with them. These additional two gallons will require extra fruit in proportion. In addition to this quantity, about two gallons more of *must* are required in order to supply the deficiency which will be occasioned by the process of fermentation and filling the casks which it will undergo; and this is done by adding the quantity of sugar necessary to bring it up to the required gravity, so that 19 gallons of *must* are requisite to make 17 gallons of wine. This method of employing two casks I would strongly recommend, both for this wine and for every other. The water and the berries are not all to be mixed up at once; three tubs are to be employed on this occasion, one for the berries, a second to bruise them in, and a third to receive them when they are bruised. One gallon of the berries is to be bruised at a time, in order that every berry may be broken, which can easily be accomplished in this manner, but would be almost impracticable were all the 22½ gallons to be broken together. Those bruised are to be removed to the third tub, and one-third of a gallon of water is to be added, and so on until the 22½ gallons are bruised, that is, after each gallon of bruised fruit one-third of a

gallon of water is to be put to it, until the 22½ gallons of bruised fruit are emptied into the third tub, and the 7½ gallons of water are added. This refers only to the making of 15 gallons, not the 15 and the two gallons. The mass is then to be well mixed, a portion of the liquor to be taken out for examination by the saccharometer, and the specific gravity noted in a book for the purpose, which it is probable will be from 17 to 18 on the instrument: the tub is to be then covered up. The next morning the mass is again to be well agitated or stirred up, and a second examination instituted. The gravity will not appear to have increased much, but as long as it does increase, the liquor must remain on the husks, because fermentation will not have yet commenced, for which no certain time can be assigned, as sometimes it may be within ten hours, and sometimes not until three days. The instrument is the only sure guide in this event; for as soon as a decrease in gravity is perceived, fermentation has assuredly commenced. The husks must be then removed, after having been well pressed with the hand, and the liquor strained. But as they still contain some good, two or three gallons of water are to be poured on them; they may again be squeezed and strained, and this second liquor added to the former, which should not be less than 19 gallons, if the 15 and the two gallon casks are to be filled. The second tub, which has been employed for bruising, is to be washed, and the whole liquor measured into it. The gravity is again to be found, for the purpose of ascertaining how much sugar will be necessary to raise the *must* to the standard gravity. We shall suppose that the compound has now been reduced to 15 by the additional two gallons of water, and our standard gravity being 110, we require 95, and that must be made up by adding sugar. By mixing 1 lb. of good refined sugar (which must invariably be used in making this wine, to keep the colour pure) with every gallon of the juice and water, an increase of gravity will be observed to the extent of 36 at the temperature of 60°. By adding a second pound to each gallon, a farther increase of 36 will be observed, making 72, being still deficient 23 —5-8 lb. more will be required, which will make an increase of 22½, and which will bring the *must* up to 109½.* I have been in the habit of using, instead of 2 5-8lbs. of sugar to each gallon, 2½ lbs. of sugar and ¼ lb. of virgin honey to each gallon. The honey must be boiled with the same weight of water for fifteen minutes, and well skimmed during that period. This plan is a little more expensive, and besides the excess of gravity, will not be so much as the same weight of sugar; but the honey adds to the wine a soft and mellow flavour, which makes it more resemble the real Champagne. The whole being put together and thoroughly agitated or stirred up, for the purpose of melting the sugar and honey, then the tub is covered

* Juice and water, say	15
2 lbs. sugar, at 36, ...	72
5-8 do.	22½
	109½

up with a blanket; and this process of agitating during the first day must be repeated every alternate hour. After the last agitation, a portion must be taken out and examined by the instrument, and recorded. It now becomes only necessary to repeat this operation morning and evening, but it must be strictly attended to, until the gravity has been reduced to 90; but the wine would be greatly improved were it reduced to 80. It is then to be strained through a fine seive, and put into the casks, one of 15 gallons, the other of two, and the remainder, which may amount to half a gallon, or a little more, be kept to fill up the casks; and this, for the first three days, should be done every three hours. A dish ought to be placed under each cask to receive the scum which the wine throws out during fermentation. There will always be a portion of fine which ought not to be thrown away, but kept for filling up the casks. A sample of the wine should be taken out every third day for examination by the saccharometer.

To ensure perfect success in the manufacture of this wine, we cannot be too careful and strict in repeating the examination of the liquid during the whole procees of fermentation. The latter ought to go on with as great regularity as possible; and should it either go on too rapidly or too slowly, means must be adopted to retard or accelerate it accordingly. If it proceeds too rapidly, racking must be had recourse to, by which means the wine is separated from the lees where the fermenting matter is present in the greatest abundance. If it proceeds too slowly, the point is to agitate the whole contents of the casks, which may easily be done by employing a wooden stirrer. The French effect this by bunging up their casks and rolling them to and fro.

Now I have brought the reader so far, I think it advisable to record here the method employed on the continent by the makers of that class of wine, after it is casked. This I have found in a very scientific work of Dr. Shannan's, Appendix, page 110.—"The French allow their wines to ferment in the casks ten or twelve days, because these wines throw out their ferment so much the more or less slowly, by how much they have more or less warmth, or as the years are more or less hot. After the wine has done fermenting, they stop up the vessels at the great bung-hole, and leave on the side forward an opening about the bigness of a French farthing, by which one may put in his finger. This they call *la broqueleur*, and then stop this up ten or twelve days after, with a wooden peg of about two inches long, for the more readily taking it out and putting it in. All the while the wines are fermenting, the vessels are to be kept almost full, to give them an opportunity of casting out all that is impure. In order for this, they must be filled up for three days within two fingers of the bung: after they have been bunged up, they must be filled every eighth day, at the little hole, for the space of two or three weeks more; and after that once a-day for fifteen days during one month or two; and after that once every two months, as long as the wine remains in the vault, if it be there for years. When the wines have not body enough, or

are too green, as it often happens in moist, cold years, and when they have too much liquor, as in hot and dry years, three weeks after the wines have been made, they must be rolled in the casks five or six turns, to mingle them with the lees, and this must be continued every eight days for three or four weeks. This mingling of the lee with the wine being repeated, will strengthen it, soften it, ripen it, and render it more forward, and make it fit to drink in as short a time as if it had been transported from one place to another. These wines must be let stand in the cellar till towards the 10th of April, when they are carried down into the vault; but as soon as it begins to be cold, they are to be carried up again into the cellar. It is of consequence to be observed, upon this subject, that the wines ought always to be in cool places, and never to suffer the heat. And as the vaults are cool in the summer and warm in the winter, as soon as it begins to be hot the wines must be carried down, whether they be in pieces or in bottles, into the vaults, and when it begins to be cold they must be carried up into the cellar."

Racking.—"There has been nothing better invented, and more useful, than the manner of drawing off wines. Certain experience convinces that it is the lee that spoils wines; and that they are never better, nor more lively than when they have been well drawn off, whether you would bottle it or keep in the pieces; it ought always to be drawn off out of one vessel into another, at least twice into another vessel, well washed, leaving the lee in the former."

Fining—"You should draw off the wines, the first time towards the middle of December; the second time towards the middle of February; and to fine them in March or April, eight days or thereabouts before you bottle it. For every piece of wine you must have of isinglass, that is the whitest, of the weight of a crown of gold, weighing two deniers fifteen grains, or sixty-three grains.* They take so many times the weight of a crown of gold, as they have pieces of wine to draw off; they put this quantity of isinglass in one or two pints of the same wine in a bucket for a day or two, to give it time to dissolve: others put it in a glass or a pint of water, according to the quantity, in order to hasten its dissolving, which is always difficult to be done: some mix it in a chopin or pint of wine, or excellent aqua vitæ.

"When the isinglass is grown soft, they handle it well, to divide it and distribute it; then, when the parts begin to separate, they put in the bucket, or vessel, in which this dissolution is made, so many pints of wine as they have casks, or pieces to draw off. Then they handle the isinglass well again, and pass it through a strainer, the holes of which should be very fine: they often pour in some of the same wine to dilute it well; and when there remains nothing in the strainer, they pass all the liquor over again through a linen cloth, and squeeze it well; and afterwards they put one good pint, or less, into each cask, and half into each carteau. They stir the wine in the piece with a

* Our wine merchants use an ounce of isinglass for a pipe of wine, and dissolve it in sour wine; the sourer the sooner it dissolves.

stick about the middle, without suffering the stick to go any lower. It is sufficient to stir the wine for the space of three or four minutes. A certain private person has contrived a quicker method of dissolving this isinglass. After it has steeped one day in water, he melts it in a skillet upon the fire, and reduces it to a ball like a bit of paste, and afterwards puts it into the wine, when it distributes itself with less difficulty.

"After what manner soever it be dissolved, care ought to be taken not to put in too much liquor, and not to put more than a proportionable quantity of water or wine to that of the isinglass. The isinglass works its effect ordinarily in two or three days; though sometimes it does not clarify the wine in six or eight; but nevertheless you must wait till the wine is clear before you change the vessel. In the winter, the seasons are often so improper for this, that there is a necessity of putting isinglass a second time into the piece, but then you must not put in more than the quantity before mentioned. But when it freezes, or the weather is clear or cold, the wine will clarify itself perfectly well, and in fewer days: it has a colour more lively and brilliant than when it is fined and drawn off in faint, moist weather. As soon as the wines are clear, they are to be drawn off, and the vessels changed. Four or five new casks are sufficient to draw off two or three hundred pieces of wine; for when they have emptied one piece, they take out the lee and put it into the old casks, wash it, and it serves to draw off another into it. They put together into separate casks all the remainders of the empty pieces: presently after they have emptied one, which they do in half an hour, they wash it with a bucket of water, let it stand to drain some moments, and then fill it with another that is to be drawn off. After the wine has been emptied out of one vessel into another the first time, they draw it off a second time, at the time we have before mentioned. Sometimes they are obliged to do it a third time, to give it a lively colour, if it has it not already; but four days before they change the cask, they give it a *frisure*, as they call it, and put in it one-third part of ordinary isinglass.

"The most experienced persons shift their fine wine out of one vessel into another, as often as they change its place, as well when they carry it down into the vault, as up into the cellar, according to the different seasons. I have known when in four years' time they have drawn it off twelve or thirteen times, and they pretend that this is that which preserves and sustains the wine, and that it has been the finer and the more delicate. Their opinion is, that the wine is continually forming a fine lee, which gives it the colour; and that to preserve it of a good white, it must be often shifted out of one vessel into another, if it be not put into bottles; and that there is no reason to fear that the wine will be weakened by this means, because the oftener it is removed the oftener you give it a new vigour; and the oftener it is drawn off the more lively and brilliant is the colour."

Matching.—"And although I have said they should not brimstone their casks, they do not fail to use a match of brimstone the first time

they change their vessels: they mingle a piece of thick linen cloth in the melted brimstone, and then cut off a bit for each cask of fine wine, about the size of one's little finger, and one as large again for every piece of common wine: they light it, and put it under the bung of every piece they empty, before that they have recourse to the bellows: according as the wine descends, it draws along with it a small scent of brimstone, which is not very strong, so as to make it perceivable, and that only leaves what will give a liveliness of colour: the same may be done the second time, when they change the cask, if it has not taken the scent the first time, otherwise it ought to be drawn off the second time without a match, to cause it to lose the scent of the brimstone, which it ought never to have. The wines that are thus clear and fine keep well in the cask two or three years, and hold their goodness in the vaults and cellars, but especially the Mountain wines that have a good body: those of the River lose their quality in the wood, and they ought to be drunk in the first and second year, or else they must be put into bottles. This wine will keep very well for five or six years in bottles."

Bottling.—"When they have a mind to draw off a piece of wine into bottles, they put a little syphon of metal into the cask, which is bent downwards to strain it into the bottle, under which there is a tub or bucket, to catch the wine which shall run over. They stop up every bottle carefully with a good well-chosen cork that is not worm-eaten, but that is solid and close. These sorts of fine corks cost fifty or sixty sols a-hundred. There cannot be too much care taken in the choosing corks, lest the wine spoil in some of the bottles, when the corks are defective; therefore, great care should be taken in the choosing them, when you would draw off fine wines into bottles, whether it be for keeping or to be sent abroad. When bottles are used that have been made use of before, they should be washed with leaden shot and a little water, to fetch off the filth that shall remain on the bottom of the bottles; but it is much better in the room of them to use small nails, because they perfectly take off all that which sticks to the glass. When all the bottles that suffice to empty one cask are filled, they tie the mouth of the bottle over to the neck with a strong packthread; and if it be a fine wine, they commonly seal it with Spanish wax, that the wine may not be changed, nor the bottles, by the domestics; and some persons have their coats of arms made on the bottles, which does not enhance the price above thirty sols per cent. When all the bottles are well stopped, tied down, and sealed, they ought to be set either in a vault or cellar upon sand, two or three fingers deep, and laid sideways, leaning against one another; when they are set upright, they form a white flower upon the wine at the top, in the small empty space that is between the top of the mouth of the bottle and the wine; for the bottles ought never to be filled up to the top, but there must be left a small empty space, of about half an inch, between the wine and the end of the cork. If this was not done, the wine would set a-working in the different seasons of the year, and break a great number of the bottles; and it does, notwithstanding, break a great many,

in spite of all the caution that can be taken; and more especially when the wine has a great deal of heat, or is a little tart. In some years the wine grows ropy in the bottles, even in the vaults, so as to rope when it is poured out, as if it had oil, so that it cannot be drunk. This is a malady that seizes the wine that has stood several months without being removed from one place to another: if it be set in the air it will remove more of its ropiness than it will if left in the vaults: it will recover itself in eight days if set in a very airy granary, better than it will often-times do in six months in a vault. When one is obliged to drink a ropy wine, if he shake the bottle strongly for the space of half or a quarter of an hour, and then uncork it immediately after he has done shaking it, the bottle, being inclined a little on the side, will cast out presently half a glass of froth or scum, and the rest of the wine will be drinkable, whereas otherwise it would not be so."

Mantling.—"For about twenty years last past, the gust of the French has been determined for a frothy wine; and this they used to love, as one may say, even to distraction. They have begun a little to come off from that for the last three years. Their sentiments are much divided as to the opinion of this kind of wine; some believe that it proceeds from the force of the drugs that they put in it, which makes it froth so strongly; others attribute it to the tartness of the wines, because the greatest part that do froth are extremely tart; others attribute this effect to the moon, according to the times in which these wines are bottled. It is true, there are a great many wine merchants, who, seeing the great fondness that there is for their frothy wines, oftentimes put in alum and spirit of wine to make it froth extremely: but it is certain, by experience, that the wine froths when it is any time bottled from the vintage to the month of May. There are some who pretend, that the nearer the vintage time the wine is produced, when it is bottled, the more it froths.

"Many do not agree in this opinion, but nothing is more certain, than that there is no time in which the wine froths more than about the end of the second quarter of the month of March, and this always happens towards the holy week. There does not need any artifice at all: one may always be sure to have wine perfectly frothy, when it is bottled from the 10th to the 15th of the month of March. Of this there is such reiterated experience, that it cannot be doubted. It is good to know that the wine does not froth presently after it is put into bottles; it must be at least six weeks, and sometimes six months, before it froths well. If it is to be transported, you must give it near a month of the vault, especially in summer, to recover its remove. But as wines (especially the Mountain wines) are not ordinarily bottled in the holy week, because they are too green, or have too much hardness, especially if the year has been cold and moist, or too much liquor expressed, if the year has been hot, the most sure and advantageous way to have exquisite wine, that is, perpectly frothy, is not to bottle it till the rise of the sap of August. It is certain, by experience, that it froths excessively when it is bottled from the 10th to the 14th of August;

and as it will then have lost the tartness or greenness of its liquor, one may be assured in bottles to have the ripest and most frothy wines. There has been another experiment tried, which is, not to bottle the Mountain wine till the holy week of the second year, that is, eighteen months after the vintage; and it has been found that it froths sufficiently, but less by half, than that which has been bottled in the rising of the sap of March the year before. It is not believed that the River wine, which has a less body than that of the Mountain, can froth so much in the second year. When one would have wine that will not froth at all, it should be bottled in October or November, the year after the vintage: if it be bottled in June or July it will froth slightly, though but little, if any thing at all.

"As these wines, especially those of the same year, work continually in the vaults and cellars, and still more in bottles than in the piece, according to the different seasons, and the divers impressions of the air, it ought not to be surprising if the same wine, especially the new, oftentimes appears different in taste. We find a wine potable in January and February, which will seem hard in March and April, because of the rising of the sap, which agitates it more; the same wine in June and July will appear entirely soft, and in August and September hard again, which one shall not be able to perceive any thing of during the preceding months, because the rising of the sap in August will put the parts in a great motion. Motion will have this effect on the River wines of the year; but oftentimes the wines of two years from the mountains will appear more mellow, more or less exquisite, more or less forward, according to the different motions it has received by the different impressions of the air, which will vary more sensibly in the different seasons of the year. There ought to be very great attention to keep the wine continually in cool places; nothing does it more hurt than heat: it is therefore of the greatest importance to have good cellars and excellent vaults. No part of the world has so good vaults as those in Champagne, which is the reason it is so difficult to find any where else such good wines as those of this province. Those who would lay up a stock of wine, and are able to keep it two or three years, or whose business it is to send it into other far distant provinces, or to foreign countries, ought to choose the Mountain wine; for as it has more body, it will better bear transportation than those of the River; and, besides, the English, the Flemings, the Dutch, the Danes and the Swedes, desire these strong wines, that can bear the transportation, and hold good for two or three years, which the River wines will not do."

Ripe Grape Wine.—Grape wine, of course, stands first, in regard to quality and character, of all domestic wines; and if a complete fermentation has been regularly conducted, from a correct standard of specific gravity, a wine not inferior to foreign will be obtained, especially when the grape is not spared, and the season is propitious. For making this wine in a plentiful year, fifteen pounds of grapes to each gallon of water are used, but twenty would be preferable. The grapes, after being picked from the stalks, are slightly broken with the hand. When care-

fully pressed, the water which we mean to use is well mixed in with the fruit so bruised, a sample is taken to be examined by the saccharometer, the gravity noted, and the tub covered. The next morning they are again well agitated and mixed, and a second sample taken, weighed, and noted, when an increase of gravity will be shown. These operations are performed morning and evening, until it is found that the gravity is less than at the last examination. This decrease assures us that the extraction has been completed; and nothing now remains but to draw off this liquor from the husks, which is accordingly done, as they can no longer communicate any thing desirable or advantageous to the wine. The fruit being pressed and the liquor drawn off, the husks are then washed with as much water as is found necessary to deprive them of any good which may yet remain in them. This liquor is then strained from them and added to the former. The whole quantity is now measured, and a portion of it weighed by the saccharometer, in order to direct the operator in proportioning the sugar. In consequence of the coldness of this climate, even grapes, ripe grapes, are deficient in sugar, and necessarily require a portion of this article itself to supply the want. The higher the gravity of the juice and water is before putting in the sugar, the less sugar will it require for a complete fermentation. After the gravity of the juice and water is found, the proportion of sugar necessary to bring the *must* up to the standard gravity of 120 will easily be ascertained. This fruit, in a dry warm year, when perfectly ripe, and the vine grown in a favourable situation, will produce, in the pure juice, a gravity of 75. By adding the same portion of water as pure juice, the gravity of 75 will be reduced to 38. By using two-thirds of pure juice and one of water, the original gravity of 75 will be reduced to 50 instead of 38, leaving then a deficiency of 70, which must be made up by sugar. As one lb. of sugar dissolved in a gallon of water is equal to 36, therefore, to supply the deficiency of 70, two lbs. of sugar to each gallon of juice and water will be required; and this will raise the gravity from 50 to 122.

The fermentation of this wine is conducted in the same manner as that of the former.

When this wine is intended to be a dry* wine, it is reduced, at its lowest gravity, to 15 or 20. When intended to be a sweet wine, to 30 or 35.

Care should be taken to examine and note the gravity at least once a-week, until the cask is bunged up. Racking is necessary in this wine, as well as in all others; but it should not be performed until fermentation has in a great measure subsided, unless it should be too violent, when the racking is necessary to give it an effectual check. The cask must be slightly sulphured, as already noticed in the case of the former wine, and the deficiency from loss of lees, made up from the fine of the small cask, as before recommended.

* When the adjective *dry* is applied to wine, it denotes that the liquor is divested of any perceptible sweetness. For instance, Mountain, or even Lisbon, from their sweetness, form a contrast to Sherry, which is a dry wine.

If the wine has been reduced to 15, one lb. of sugar-candy is put into the cask, which is then bunged up, and allowed to stand for fifteen months before being bottled. Two years in the wood, instead of fifteen months, greatly improves grape wine. In this case, however, it is necessary to examine the wine every six months, and make up any deficiency of quantity by adding spirit, and a small portion of water and sugar.

The Honourable Charles Hamilton's mode of making Ripe Grape Wine.—The following is the account given by the Hon. Charles Hamilton of his success in making wine from grapes in this country:—"The first year, I attempted to make red wine in the usual way, by treading the grapes; then letting them ferment in a vat, till all the husks and impurities formed a thick crust on the top: the boiling ceased, and the clear wine was drawn from the bottom.

"This essay did not answer: the wine was so very harsh and austere, that I despaired of ever making red wine fit to drink; but, through the harshness, I perceived a flavour something like that of some small French white wines, which made me hope I should succeed better with white wines. That experiment succeeded far beyond my most sanguine expectations; for, the first year I made white wine, it nearly resembled the flavour of Champagne; and in two or three years more, as the vines grew stronger, to my great amazement my wine had a finer flavour than the best Champagne I ever tasted; the first running was as clear as spirits; the second running was *œil de perdrix;* and both of them sparkled and creamed in the glass like Champagne. It would be endless to mention how many good judges of wine were deceived by my wine, and thought it superior to the best Champagne they ever drank; even the Duke de Mire Poix preferred it to any other wine; but such is the prejudice of most people to any thing of English growth, I generally found it prudent not to declare where it grew, till after they had passed their verdict upon it. The surest proof which I can give of its excellence is, that I sold it to wine-merchants for fifty guineas a hogshead; and one wine-merchant to whom I sold 500*l.* worth at one time, assured me that he sold some of the best of it at 7*s.* 6*d.* to 10*s.* 6*d.* per bottle.

"After many years' experience, the best method I found of making and managing it was this: I let the grapes hang till they had got all the maturity which the season would give them; then they were carefully cut off with a pair of scissors; and brought home to the wine-barn in small quantities, to prevent their heating or pressing upon one another; then they were all picked off the stalks; and all the mouldy or green ones were discarded, before they were put in the press, where they were all pressed in a few hours after they were gathered. Much would run from them before the press squeezed them, from their own weight upon one another. This running was as clear as water, and sweet as syrup: and all this of the first pressing, and part of the second, continued white: the other pressings grew reddish, and were not mixed with the best. As fast as the wine ran from the press into a large re-

ceiver, it was put into the hogsheads, and closely bunged up. In a few hours one could hear the fermentation begin; which would soon burst the casks, if not guarded against by hooping them strongly with iron, and securing them in strong wooden frames, and the heads with wedges. In the height of the fermentation, I have frequently seen the wine oozing through the pores of the staves.

"These hogsheads were left, all the depth of winter, in the cool barn, to reap the benefit of the frosts. When the fermentation was over—which was easily discovered by the cessation of the noise and oozing; but, to be more certain, by pegging the cask, when it would run quite clear—then it was racked off into clean hogsheads, and carried to the vaults, before any warmth of weather could raise a second fermentation. In March, the hogsheads were examined; and if any were not quite fine, they were fined down with common fish-glue, in the usual manner: those that were fine of themselves were not fined down; and all were bottled about the end of March; and in about six weeks more they would be in perfect order for drinking, and would be in their prime for above one year; but the second year the flavour and sweetness would abate: and would gradually decline, until at last it lost all flavour and sweetness; and some that I kept sixteen years became so like OLD HOCK, that it might pass for such, to one who was not a perfect connoisseur. The only art I ever used to it was putting three pounds of sugar-candy to some of the hogsheads, when the wine was first turned from the press, in order to conform to a rage that prevailed to drink nothing but the very sweet Champagne.

"I am convinced much good wine might be made in many parts of the south of England. Many parts are south of Painshill; many soils may be fitter for it, and many situations must be so; for mine was much exposed to the south-west wind (the worst of all for vines), and the declivity was rather too steep: yet, with these disadvantages, it succeeded for many years. Indeed, the uncertainty of our climate is against it, and many fine crops have been spoiled by May frosts and bad summers; but a good year balances many disappointments."

Raisin Wine.—There are various ways of manufacturing this wine, but the following, which I have practised for several years with perfect success, appears to me in every respect preferable to any other. Before proceeding further, it may be noticed that many thousand pipes of raisin wine are annually made for the purpose of adulterating foreign wine.

The raisins which I use for making this wine are those which are imported from Malaga. They are sold in baskets of 56 lbs. weight, and the price varies from 36s. to 45s. per cwt. The very best of that class of raisins should if possible be used. In cases, however, where this raisin cannot be obtained, that which I have found the best substitute for it is the Valentia raisin.

Instead of using all Malaga raisins, an equal portion of Muscadine and Malaga will improve the flavour, but the expense will thereby be considerably increased.

This wine may be made either sweet or dry, according to the taste of the manufacturer. The tedious part of the process is the proper separation of the stalks from the raisins; but this is absolutely necessary, for were they allowed to remain they would impart a disagreeably astringent flavour to the wine. There is in this fruit a sufficiency of fermenting matter, that is, natural leaven to produce spontaneous and complete fermentation without artificial means being had recourse to. To make 17 gallons of this wine, 15 gallons of *must* ought to be put into a large cask, and two into a small one; but in addition to this quantity, there ought to be about two gallons more, for the purpose of supplying the deficiency caused by evaporation; so that altogether there will be required to make 17 gallons of this wine about 19 gallons of *must*. Of raisins, 104 lbs. will be required, being 6 lbs. of fruit to each gallon of water.* After the raisins have been stripped from the stalks, they are to be put into a barrel of 36 gallons measure, the head of which has been taken out. Every 28 lbs. of raisins will imbibe about a gallon of water; hence, to make 17 gallons of wine (employing 19 gallons of *must*), about 23 gallons of water will be required. For facilitating our calculations, we shall suppose there are 24 gallons. Two-thirds of this quantity ought to be heated to between 90° and 100°, but not to exceed the latter degree of temperature; and, after reserving a small portion for washing the stalks, so as to deprive them of any saccharine matter which they may retain, this is to be poured upon the raisins in the barrel. The whole is then to be well stirred up and allowed to remain. The other third of water, or eight gallons, is to be reserved for the second infusion.

The operation of stirring and bruising the fruit must be carefully performed every morning and evening for 18 days, more or less, according to the state of the weather. A sample of the liquor ought to be taken out for the purpose of being examined by the saccharometer at each operation, and the gravity recorded; for as long as the *must* continues to increase in weight, and even after attenuation has become apparent, fermentation is still extracting good from the fruit.

Whenever the gravity is found rapidly to decrease, it becomes necessary to withdraw the raisins from the liquor, and after pressing them, to pour the remaining eight gallons of water upon them. This second infusion is conducted in the same manner as the former one. The husks are to be put into a tub, and washed with as much water as will make up 19 gallons, being the quantity of *must* required to make 17 gallons of wine, as before observed. In order to extract any good that may yet remain in them, they must be left for twenty-four hours, then re-pressed, and the strained liquor added to the former. The barrel in which the raisins were steeped is to be properly washed, and the

*It may be laid down as a rule which has no exception, that not only is it more profitable to make a large than to make a small quantity of wine, but the quality of the article is thereby greatly improved, on account of the fermentation proceeding with more alacrity and with more equability in the one case than in the other.

whole of the un-pressed juice measured into it, where it is allowed to ferment. A portion ought to be taken out for examination. As the must will now be found to be about 90 in gravity, in consequence of the strained liquor being put into it, as well as from the decrease in gravity caused by fermentation in the infusion, sugar is to be added, until the gravity of the must is brought up to 135, an allowance of 10 gravity being made at the same time: that is, the raisin gravity of 90 should be reckoned 100 instead of 90.

It must be here observed that fermentation varies in different seasons of the year. In warm weather, it will go on so rapidly that the *must* will decrease in gravity in a greater proportion than it will increase, whilst in cold weather this will not be so apparent. When the gravity greatly decreases, that is, when it is found by the saccharometer to have fallen from 10 to 15 of gravity in 24 hours, 10 degrees of gravity, in addition to what is allowed in the former instance, must be allowed on this account at the time of proportioning the sugar, to bring the must up to the standard.

Upon examination with the instrument, if the highest gravity be found only 90, it must be reckoned 100, because at least 10 degrees have been attenuated. Two processes are going on at the same time, those of extraction and attenuation. In the early stages of fermentation, there is little attenuation; but as the temperature increases, which is always the case in the middle and latter stages of fermentation, the attenuation goes rapidly on: so much so is this the case, that a considerable quantity of good is extracted from the raisins which is not shown by the instrument. It is to make allowance for this that 10 degrees are added to the highest gravity indicated by the saccharometer.

The gravity which I have found best for making this wine is 135, but 120 will make an excellent article, (that is 125, as shown by the saccharometer.) Thus—

Two infusions	=	90
Allowance for extraction, not indicated by the saccharometer, ...	=	10
1 lb. of sugar to each gallon	=	36
		136

To raise it to 136, it will require at least one pound of sugar to every gallon. The whole must now be well mixed, in order that the sugar may be dissolved. If the weather is cold, the barrel ought to be placed in a room where there is a fire, that the cold may not check the fermentation. The process of stirring and examination is to take place every morning; and if fermentation is not checked by cold or other casualties, in the course of a week the gravity will likely fall to between 90 and 100. But, as I said before, this will in a great measure depend upon the warmth of the weather, and the punctuality with which the *must* is agitated. When it has fallen to the point or gravity 90, it may be put into the casks for final fermentation. This operation will tend to check it; but to avoid danger, I would advise that the casks be washed out with boiling water, and the *must* put in whilst they

are warm. Attention should be paid to ascertain that fermentation has not been seriously checked by the operation. If this evil has taken place, the *must* will be dead, and will not throw up the scum, whereas if it was going on properly it would do so. Should the *must* remain in this dead, or rather dormant state, for twelve hours, a small portion, say three table spoonsful, of good thick brewers' yeast should be mixed with a quart of this *must* heated to 80°. This heated *must* and yeast must then be put into a vessel capable of containing two quarts, as it will expand. In about an hour after this, expansion will take place and be accompanied by a lively fermentation. At this period it should be put into the casks, and the whole liquor well roused up, when there is little doubt it will have the desired effect. With raisin *must*, it is a rare case that artificial means are necessary to excite fermentation. It is rather inclined to ferment too violently; in which case it requires to be checked, as this evil is attended with more danger to the wine than languid fermentation. There are various methods of checking too violent fermentation, and these I shall take occasion afterwards to describe.

Casking.—The casks should be placed with the bung-hole obliquely inclined, so as to allow the scum or yeast which the fermentation throws up, to flow readily out. The casks should be so elevated, and the stands so contrived, as to allow under each cask a tub of sufficient capacity to hold the whole of the wine at the time when it is necessary to rack or decant it. All the time the *must* is fermenting in the cask a dish should stand under each (if two are to be filled, as we have supposed), for the purpose of receiving the discharged liquor or scum, or more properly speaking both. From time to time the fine must be run off from the dishes into the vessel containing the liquor reserved for filling up. With the generality of wine-makers the business is now over. They bung the wine up according to receipt, at a fixed period, put it into the cellar, and think no more about it, until, as informed by receipt, the time has arrived when they should bottle it. When they come to examine it, they find the bung out, or partially so; and instead of the contents of the cask being wine, they are too frequently found to be moulded vinegar. Those who are conversant with the subject, know that even from this period increased attention and skill are requisite to direct them to avoid either too much or too little attenuation, that is, too much or too little decrease in the gravity. There can be no doubt that the precaution used at the commencement of this intricate stage—as it may well be called—determines the early or late period of natural fineness, the wholesomeness or unwholesomeness of the wine, and creates from the same materials different distinctions in the flavour. But strict attention to the several stages of its progress is also absolutely necessary to fix the principles of preservation and flavour.

To return to the wine which we left newly casked at the gravity of about 90, though it may be more or less as before noticed, the *must* (being properly now called wine, as it is vapid and void of sweetness),

[illegible] which is easily known by [illegible] decrease of gravity, ought to be [illegible] the violence of its fermentation; [illegible] from the vinous to the acetous [illegible] of wine. It may be observed, [illegible] long as the gravity continues [illegible] should it be racked off [illegible]. By this operation it is deprived of a [illegible] and subsided with the lees. [illegible] over-excite fermentation [illegible] racking checks this tendency. [illegible] the wine of the desired [illegible]. For as long as any [illegible] visible or not, in the [illegible] will not cease. The fine [illegible] into a separate [illegible] slightly sulphured, and two [illegible]. The [illegible] is now to be shaken, so that [illegible]. The fine wine is to be [illegible] has been examined with [illegible] by the loss of lees made up, [illegible] and the lees from the large [illegible] be taken that the cask is [illegible]. A small bung must be put in first, [illegible] escape, and it should [illegible] ascertain that the gravity of [illegible]. At this period it should be [illegible] having made a spile or air hole at [illegible] from the bung-hole, and a peg or [illegible] the saccharometer, at this [illegible] or under (which is [illegible] racked again, and treated as [illegible]: and the wine is [illegible] the spile to be left [illegible] firmly into it. The spile may [illegible]: and should the appearance of [illegible] will escape without any froth arising. [illegible] with the escape of the [illegible] filled up with whisky. The [illegible] again, and the spile left out for a few hours.

When Malaga [illegible] manufacturing of this wine, it [illegible] of February or March. Should the [illegible] Sherry, by the addition of 10 lbs. [illegible] Malaga, his end will be attained, and the wine will also be improved [illegible] and flavour. I have also found, by the addition of Argol, 1 ounce to each gallon of must, with 3 ounces of salt to 10 gallons after the operation of pressing, having been previ-

ously dissolved in a small portion of water heated to 180°, and put into 2 quarts of the *must*, that the wine is also greatly improved. Indeed the addition of the Argol to every home-made wine, to this or to a less extent, is beneficial. But as I intend to enter more fully on the properties of this acid in another part of the present treatise, it is unnecessary to dwell upon it here.

This wine should remain in the cask as long as possible, and at the earliest should not be bottled until after the following spring. But if it is allowed to remain in the cask a few months longer, even till the end of autumn, it will greatly add to its brilliancy, as well as to its vinosity.

N.B. Raisin wine made after this receipt will not be a dry wine, but a rich one, resembling Mountain.

The following is a statement of the cost of manufacturing seventeen gallons of raisin wine; say—

		£.	s	d.
112 lbs. Raisins	at 4d.	1	17	4
19 lbs. Sugar	at 6d.	0	9	6
Half Gallon Whisky	at 8s.	0	4	0
1 lb. Argol	at 6d.	0	0	6
		2	11	4

Supposing that there is a return of sixteen gallons of fine wine, which is allowing one gallon for lees, it will cost about 3s. 2d. a gallon, or 6s. 4d. a dozen.

Dry Raisin Wine.—To make the same quantity of wine as in the former receipt, 2 lbs. of raisins additional to each gallon of water, making in all 8 lbs. of raisins to each gallon of water, ought to be used. Seven lbs. would make an excellent wine, but 8 lbs. will produce one greatly superior. The fruit is to be stalked, steeped, and treated exactly in the same manner as in the former instance; while the *must* ought to be examined as frequently as before, and regularly noted. This *must* requires no sugar. It does not require any difference in the process, except reducing its gravity, before being casked, to 65 to 70, or as nearly as possible to one-half of its original gravity, instead of to 90 to 100, as in the case of the former wine. As it is almost impossible to reduce a small quantity of *must* with the same accuracy as a large one, the small quantity not retaining its own heat, we should endeavour to remedy the defect by taking out a portion of the *must* occasionally, warming it to the degree of 96 or 100, and mixing it again well with the whole body of *must*. Raisin wine, however, without sugar, even when made in so small a quantity as 17 gallons, seldom requires this remedy to invigorate it, if due attention is paid to the agitating of it evening and morning. When it is casked, it is to be treated exactly in the same manner as the raisin wine with sugar, except that the gravity of dry raisin wine is to be reduced to 15 to 20 instead of to 30 to 40. If to each gallon of this *must* a quarter of a pound of virgin honey is added, having been previously boiled up with a small portion of the liquor taken from the second pressing of the raisins, and well skimmed (to the extent of half a pint to each quarter of a pound

of honey), the wine will have imparted to it a delicious mellow flavour.

Allowing that we have only 16 gallons of fine wine, this will cost about 3s. per gallon or 7s. per dozen.*

If to either this or the former wine, two gallons of Bronte Madeira be added to the seventeen at the time of racking, its flavour will be completely altered, and a foreign character, somewhat resembling that of Lisbon wine, will be imparted to it. At all events, the peculiar characteristic of home-made wines will by this treatment be completely destroyed. Bronte Madeira may cost about 10s. or 11s. per gallon, so that by using it, the price of the home made article will be somewhat raised.—*The British Wine Maker, Second Edition,* 1835.

TO PRESERVE FRUIT OF ANY KIND EITHER IN A GREEN OR RIPE STATE WITHOUT SUGAR.

At a Meeting of the Newick Horticultural Society, June, 1834, a copy of *Baxter's Library of Agricultural and Horticultural Knowledge,* was offered by the publisher as a premium for the best specimen of fruit, preserved either in a green or ripe state. The prize was awarded to Mr. Morrison, who has furnished the following particulars:—

Provide the common sized fruit bottles, and let them be thoroughly clean and dry. Gather the fruit perfectly dry, and fill the bottles quite full by shaking them, let them be well corked, and tie the corks securely in opposite directions with strong twine. Place or pack the bottles in a large boiler or copper with hay, then cover with cold water, and let it *boil* three or four minutes; after which the fire should be taken out, but the bottles be permitted to remain till the water is cold; the bottles may then be taken out, and when the corks are dry they may be dipped in rosin and the bottles placed in a cool cellar. By this simple process the fruit will be found to retain its full flavour for any length of time. The large kinds of fruits may be cut into slices.

ON THE MODE OF PACKING FRUIT TO SEND TO A DISTANCE.

BY MR. T. WILSON, GARDENER TO THE RIGHT HON. EARL DE LA WARR.

For peaches my plan is this: I procure a box of a size proportionate to the quantity of fruit that I wish to send, some tow, and some silver paper. I cut the paper into small squares, and place one square

* Statement of the expense of manufacturing 17 gallons of this wine—

		£.	s.	d.
152 lbs. of Raisins	at 4d.	2	10	8
Argol		0	0	6
Whisky, one half gallon	at 8s.	0	4	0
		2	15	2

smoothly round each peach; after this, I put a small quantity of tow carefully and evenly around the paper. Into the bottom of the box I put a thin layer of dried moss, on which I put the fruit as closely together as possible, and in the following manner: I pack two layers without anything more between them than the paper and tow which surround them; I then carefully support a thin board by three nails from the outside, so that the board may not press too much on the fruit below; this board forms a second floor, on which I pack two layers more, and so on. If melons are required, they may be closely packed in the lower chamber, or in the top part, if any vacant space remain; but care should be taken to fill up any vacancy well with tow.

Grapes I pack as follows: Into the bottom of a box I put a shallow layer of clean bran; I then put in closely a layer of bunches of grapes that are perfectly dry, and from which all the decayed berries have been carefully removed; I then strew in as much bran as will cover them, and so on till the box is filled; taking care to shake the box gently as I proceed, that the bran may fill up every crevice, and prevent the bunches from being displaced during their journey. The person who unpacks the fruit may easily clean away the bran, by blowing smartly through the bunches with a small pair of bellows.

For packing strawberries, I provide a quantity of small upright wicker baskets, made to hold from a pint to a quart each; I fill them by putting the fruit in very closely together as I gather it; I then tie the basket down carefully, and closely pack them in an upright position in a large flat basket made for the purpose. Strawberries, thus packed, will be quite fit to go to the table after one day's journey; and it is advisable never to attempt to send this fruit to a distance which will require it to be two days on the road.—*Gardener's Mag.*, vol. x.

RULES FOR COTTAGERS.

On saving seeds.—The only seeds that are worth the cottager's while to save are those of onion, scarlet runners, radish, and coss lettuce; as to cabbage, savoy, carrot, parsnip, &c., there is such risk in saving them true, and cost so little, if bought, that the amount can be no object to the buyer. When attempted, however, the finest and truest specimens of the crop should be chosen to produce seed. A few plants of radish and lettuce may stand where they were sown; a score of the first pods may be left on the runners; and half a dozen of the best onions planted in a row on an open spot in the garden in the month of February, will yield seed enough for the following season. Indeed, saving onion seed should be a particular object with the cottager; as by having ten or twelves ounces to sell, will enable him not only to buy all his other seeds, but a load or two of dung besides.

QUANTITIES OF SEEDS REQUIRED IN A SMALL GARDEN.

1 pint of early peas is enough for a row of 20 yards in length.		
1 ditto beans	ditto	27 ditto.
1 ditto runner	ditto	26 ditto.
1 ditto dwarf kidney	ditto	26 ditto.
1 ditto marrowfat peas		32 ditto.

1 oz. onion seeds sows 15 square yards; ½ oz. leek, 7 square yards; 1 oz. carrot, 15 square yards; 1 oz, parsnip, 15 square yards; ½ oz. of cabbage, savoy, borecole, broccoli, cauliflower, is enough for a seed bed of 4 square yards; ½ oz. turnip, 11 square yards; of radishes 2 or 3 oz. for spring sowings, and 1½ oz. for autumn. A bed of asparagus, 5 feet by 30, requires 160 plants. An acre of potatoes requires from 15 to 20 bushels of sets.

The foregoing particulars will serve as a scale for apportioning other kinds of seeds, according to the size of the seeds respectively, and extent of the ground to be sowed or planted.—*Catechism of Gardening.*

PRESERVATION OF DRIED SWEET HERBS.

Mr. Lindsey, gardener to the Duke of Devonshire at Chiswick, has made a great improvement in the mode of preserving dried sweet herbs; such as thyme, marjoram, savory, sage, &c. After drying them in the usual manner in the shade, he puts each sort into a small box, 8 in. or 10 in. long, by 5 in. or 6 in. broad, and 6 in. or 8 in. deep; and by means of boards of the size of the interior length and width of the box, and a screw-press, he presses the herbs into cakes, or little trusses, about 8 in. long, by 5 in. wide, and 2 in. thick. These are afterwards carefully wrapped up in paper; and, being kept in a dry place, are found to retain their aroma, in as perfect a state as when they are put in the press, for at least three years.—*Gardener's Mag.*

MISCELLANEA.

AGRICULTURAL CALENDAR.

JANUARY.

Field Operations.—Ploughing during this month can seldom be performed with advantage, save upon some favoured soils and in dry seasons; but when and where practicable, the stubbles intended for beans may be ploughed, and the seed sown upon the fresh furrow. Should the weather permit the land intended for fallows, if not ploughed before Christmas, should now have their first furrow. When ploughing is impracticable, the teams may be profitably employed in carrying out marle, chalk, &c., upon those soils which are improved by this species of manure, collecting the mould from newly made ditches, hedge rows, &c., for the foundations of mixens. Making hedges, cutting down underwood, under-draining, &c., commenced before Christmas, will still be carried on.—Thrashing corn, so as to afford a sufficient supply of straw to the cattle in the yards, and pickings for the hogs and poultry at the barn door, is of great importance during this and the two following winter months.

Attention to Live Stock.—Fodder neat cattle with hay, haulm, or straw, with a portion of potatoes or turnips; care in storing these articles is necessary, as inclement weather is usual at this time, and it is of much importance that the animals be periodically fed, keeping precisely to the hour; and that especially the younger cattle be allowed a pasture, with yards and sheds properly littered. If cows calve this month, give them turnips, cabbages, or other green food, with hay, which mixture of food will ensure a due supply of milk. Ewes, having forward lambs, should be well sheltered and duly fed with turnips and hay, turnips alone are insufficient; these animals are injured and often lost by neglect, and a deficiency of nourishing food.

FEBRUARY.

Field Operations.—Beans and peas are to be sown this month, later sowings seldom answering so well; spring wheat on dry soils; black oats, winter tares, and rye if the autumnal sowing has failed, may likewise be put in. Hop grounds require to be well dug and manured, and laid up dry; continue to carry out top dressings upon wheat and meadows. Grass lands will be greatly benefitted by rolling, harrowing, and by keeping the water furrows and ditches clean. Continue to under-drain wet soils; catch moles; collect mould and rubbish for composts. This is the proper month for setting quick for hedge rows, planting osiers, willows, and poplars, cutting wood, felling timber for repairs on farm; making new hedge rows should also be sedulously attended to. Threshing goes on as usual. Ploughing lands for summer fallow, if neglected in the autumn, should not be deferred.

Attention to Live Stock.—Cold weather is usually very severe during this month, and animals of every description require the continued protection suggested in the foregoing month. Cattle in progress of being fattened should, in addition to potatoes, turnips, and mangel wurzel, be amply supplied with linseed cakes or oil, and a proper proportion of salt. Flocks are beginning to lamb, and require unremitting attention.—Milch cows and fattening calves will pay for assiduity. The fatted house lambs should be completed for sale.

MARCH.

Field Operations.—This is the proper seed month for oats; upon all lands which will bear the plough no time should be lost in sowing this useful grain. Beans and peas, if not sown last month, may still be put in, but the produce will seldom equal a February sowing. Spring tares and barley at the latter end of the month may be sown. Flax and hemp are sown in some districts, but in most cases an April sowing is preferred. If the weather permit, roll and harrow wheat. Potatoes for an early crop, and the later sorts on dry soils may be planted with great advantage. Roll and harrow grass lands; and remove all stock by the end of the month from meadows intended for mowing. Feeding meadows after Lady-day is a bad practice, and must inevitably diminish the quantity of hay. Lands intended for turnips should have a second furrow, and the composts intended to be carried on turned over. Composts well made, constituted of half dung and the other of mould laid up the previous year and pulverised by frost, are considered by good judges the very best manure for turnips. Hedge rows may still be made and timbers felled, except oak, which is seldom cut down till April, when the sap begins to run, and the bark is made to pay for felling.

Attention to Live Stock.—The flocks are now dropping the lambs freely, and the ewes should have a plentiful supply of turnips or other green food, with hay in abundance, to keep the stock in good health; by adopting this course the farmer will be amply remunerated,

provided the stock can afterwards be fed on forward pasture. Cows and calves, mares and foals, should be well fed and kept warm. Continue to feed the fattening cattle as advised, and have a special regard to cleanliness. It is well to get rid of all fat hogs before this month is out, and pay attention to breeding sows, which should be ready to drop their first farrow by the 1st of April.

APRIL.

Field Operations.—This month, in most of the barley counties, is the principal season for putting in this most valuable grain, though some sow as late as May, April is the month to be preferred. Oats are still sown on late and cold soils, but this is matter of necessity, not choice. White peas, and the grey sorts of quick growth, may now be sown. The land being sufficiently dry and pulverised, this will be found the proper month for sowing Lucern, Saintfoin, clover, rye-grass, either on clear ground or among corn. Continue to roll and harrow wheat. In those districts where it is customary to feed off wheat with sheep, great care should be taken not to let them feed too late; the first week in April will always be found quite late enough to allow sheep to run on the land. In some favoured and early districts, tares and clover seeds are sufficiently forward to turn in young cattle, or sheep; and rye may be cut before the end of this month for sorting. The hop-grounds will now require great attention: the land should be kept perfectly clean, and the mould gently dragged towards the young shoots. Oak timber by the middle of the month may generally be felled. Plant potatoes for a full crop, mangel wurzel, &c.

Attention to Live Stock.—All the animals require a continuation of the system of management proposed last month. The turnips being consumed, the sheep may be turned into the rye grass and clover. Do not turn the neat stock out of the farm-yard until the weather be favourable, and there shall be sufficient grass in the pastures.

MAY.

Field Operations.—This is the time to commence active operations with the hoe. Beans and peas should be attended to as early in the month as possible, and in general they will require a second hoeing before the month is out. Wheat and the early sown spring corn should likewise be cleaned of weeds, either by the hand or hoe. Weeds, if suffered to get a head during this month, must inevitably injure the crop, and can seldom afterwards be eradicated. Hoe and mould up potatoes. Poll and tie up hops. Clover and young seeds, fed off by sheep, and intended for seed should be shut up as early in the month as practicable. Paring and burning, a most important branch of agriculture, should now be commenced and* continued with spirit, through this and the successive month. Barley may still be sown, and potatoes

* See *Baxter's Library of Agricultural and Horticultural Knowledge*, p. 502, *Third Edition.*

for winter food still put in. White and quick growing peas may still be sown, the land having been brought to a fine tilth, and well manured. Tares for successive crops may still be sown. Cross plough all fallows, not done the last month. Turnip lands should be now worked with spirit: bringing the soil to a fine state of pulverisation by the various operations of the plough, harrow, and roller. Composts may be carried out, and the seed sown by the latter end of the month.

Attention to Live Stock.—Continue to feed the stalled cattle as before directed. Calves may now be weaned. About the middle of the month there probably will be sufficient grass to leave off foddering. Rye-grass, meadow, and young clover may now be depastured; but be careful to avoid the neat cattle being blown or hoven on the clover. Sheep should close feed the grass.

JUNE.

Field Operations.—This is the principal month for sowing turnips: Swedes and some of the earlier sorts should be put in by the second week; and later sorts should be sown by the end of this, or early the next month. Fallows intended for wheat must now be sedulously attended to; June and July are called by some the great fallow months; and as general practice during this season, the great benefit from fallowing must be derived. The land having been cross ploughed should now be brought to a finer state by the harrow, in order to allow the seed weeds to vegetate before the manure is put on. Pick up and burn all couch grass, rubbish, &c.—Hoeing and weeding of corn may still go on. Hops, potatoes, &c. should also be kept clean. Cabbages may now be planted, lettuce for hogs, &c. Clover and the early grasses are generally mown this month. Mixens intended for the fallow should be turned over. Continue to pare and burn. Tares and clover may now generally be mown for soiling—a most profitable branch of agriculture, if well attended to. Great quantities of excellent manure may be made in the home steads by feeding horses and neat stock on green food. Sheep, too, fed on tares and clover by the folder is an excellent practice, being on moist soils the best preparation for wheat.

Attention to Live Stock.—Sheep feeding on inclosures, especially in a woodland district, should be examined daily, as to their being fly-struck, for this malady, if neglected, in twenty-four hours becomes incurable: should maggots be discovered they must be clean scraped off, and a small quantity of white lead be deposited amongst the wool, and the powder to be shook down to the wound; as a preventive, melt some lard, into which stir flour of brimstone until it acquires a proper consistency; a piece about the size of a small walnut to be rubbed between the hands, and drawn along the back of each sheep. Sheep are being shorn about this time, the shearers sometimes cut too close; a small quantity of powdered charcoal should be sprinkled upon the wound.

JULY.

FIELD OPERATIONS.—This is the general season for haymaking, and no time should be lost in cutting the grass and carrying it home; "all hands a-hoy," as the sailors say, is a good maxim for hay time as well as harvest. Turnips are still to be sown, and the earlier crops hoed. Fallows for wheat should, during this month, have their third ploughing. Continue to soil cattle in the homesteads, previous care being taken to have successive crops of tares, &c.

ATTENTION TO LIVE STOCK.—During hot weather neat cattle should, in the shade, have green food, and the weak cattle separated from the stronger, to insure their having a due portion thereof. Calves about this time are weaned, and require to be well fed. Sheep should have a good supply of water and shade where it can be obtained.

AUGUST.

FIELD OPERATIONS.—This is the great harvest month, and the farmer must now apply his whole force to gathering in the fruits of his labours; the plough and the hoe must not, however, be neglected. Fallows not ploughed last month must no longer be delayed; and where lime is used for manure it should always be carried on the ground before the end of this month. The young turnips must be carefully attended to, or the farmer will find to his cost, all his previous labour and expense of preparation has been in vain. Soiling may still go on in the homesteads.

ATTENTION TO LIVE STOCK.—Lambs on being weaned should be put to a full supply of food; the proper sort is pasture land on which the grass has been preserved; where that or other sources fail, it may be necessary to give them early-sown turnips. Select and set apart from the flock the aged and defective ewes, as a preparation for sale at the proper markets.

SEPTEMBER.

FIELD OPERATIONS.—The harvest is still going on, though in the southern parts of the kingdom generally finished by the middle of this month. Manures should now be carried out on the fallows; the earlier in the month the better; nothing being left to be done but landing up and putting in the seed. Stubbles intended for tares and winter barley should now be ploughed; and as a general practice the seed put in by the end of the month, though, if tares permit, twice ploughing for tares will be found to answer a good end. Cut stubble and carry it into the homesteads, and stack it about the yards ready for use. Stubble cut early is worth twice as much for tiller as that suffered to remain in the field till it becomes half rotten. This is the proper time for clearing ponds and marshy ditches, to be laid up for the bottom of composts. Apply manures and composts to meadows. This is the proper month for sowing rye, which should always be put in with manure and on a good tilth if a good crop is looked for. In

some districts, wheat is sown in this month; but as general practice, not to be recommended.

Attention to Live Stock.—Early foals may now be weaned, and all lambs not before weaned should be separated from the ewes; this is an approved month for putting the rams to the flocks. The swine are of course in the stubbles, or in the woods, feeding on the scattered grain. The grazier should select such neat cattle as he purposes to fatten in the yards or stalls, and prepare accordingly.

OCTOBER.

Field Operations.—This is the general seed time for wheat, and on heavy, stiff lands it cannot safely be deferred later; upon rich and dry soils, the crop may be too luxuriant, and spend itself before winter; but upon the generality of soils, in the present state of cultivation, there is no fear of this from an October sowing. Tares, rye, and winter barley may still be sown, and winter beans by the end of the month; on lands of difficult cultivation, and not often to be got upon for a February sowing, we should strongly recommend the trial of this species of beans. Meadows may still be manured, and stubbles cut. Threshing is generally begun this month, and the cattle taken into the yards.

Attention to Live Stock.—Wedder sheep intended to be fattened should be put on turnips. Cows to be taken into the yard and fed proportionably as they may be in milk, or otherwise. Foals are to be weaned, and the brood mares to be kept on dry provender.

NOVEMBER.

Field Operations.—Wheat is still to be sown, and on light and favoured soils, this is the principal seed time. Tares for successive crops are still sown, and winter beans are in most places put in this month. The seed time being over, the plough must commence its operations for the successive year. Lands intended for turnips, or a winter fallow for barley should now receive their first furrow. Lands not ploughed before winter are often impoverished and made foul by the growth of weeds and winter grass. Hedge rows may now be begun to be made, ditches cleaned out, under-draining commenced, and meadows that are dry still manured. Chalk marle and clay may likewise be carried to the lands, if opportunity suit.

Attention to Live Stock.—Remove neat stock and horses from the fields, and place them in yards, sheds, and stables, with due food, litter, and protection from inclement weather.

DECEMBER.

Field Operations.—Thrashing is one of the principal operations of this month. Fresh plough the stubble for next year's fallows in dry seasons. Repairing fences, making hedge-rows, cleaning water furrows or meadows, clearing the ditches round the corn fields, col-

lecting dirt, mould, and marle for composts, &c., should be attended to. Meadows, if not too wet, may be rolled this month to great advantage. Wheat and winter beans are still sown in some districts.

ATTENTION TO LIVE STOCK.—Cattle of every description should now be well fed, freely littered, and carefully sheltered. Swine also should so be treated for their improvement, as well as for the valuable manure produced. Sheep although last named are the first in usefulness, should, with green food, be allowed hay daily; and, notwithstanding any opinion to the contrary, a few peas, and a small allowance of linseed cake is very profitable,—insuring the fattening of the sheep in due time.

AN ABSTRACT

OF THE

ACTS RELATING TO AGRICULTURE,

AND A

LIST OF PUBLIC GENERAL ACTS,

PASSED DURING THE SESSION OF 1835, BEING 5 & 6 WM. IV.

Chapter 1. Explains an Act of 1. W. 4. for the more effectual administration of justice in England and Wales, so far as relates to the execution of criminals in the county of Chester.

2. Amends an Act of 38. G. 3. for preventing the mischiefs arising from the printing and publishing newspapers, and papers of a like nature, by persons not known, and for regulating the printing and publication of such papers in other respects; and to discontinue certain actions commenced under the provisions of the said Act.

3. For the service of 1835.

4. For raising 15,000,000*l.* by exchequer bills for the service of 1835.

5. Mutiny Act.

6. Indemnifies the governor-general, and other persons in respect of Acts done in the administration of the British territories, in the East Indies, subsequent to 22nd April 1834, and makes those Acts valid.

7. Marine Mutiny Act.

8. Abolishes oaths, and affirmations taken and made in various departments of the state, and substitutes declarations in lieu thereof; and suppresses voluntary and extra-judicial oaths and affidavits.

9. To apply 8,000,000*l.* to the service of 1835

10. To allow, until 28th July 1835, the importation of certain articles, duty free, into the island of Dominica, and to indemnify the governor, and others, for having permitted the importation of such articles duty free.

11. Annual Indemnity Act.

12. Continuing duties on sugar until 5th July 1835.

13. Declares that all foreign corn imported into the Isle of Man shall be subject to the same duties as are imposed on corn imported into the United Kingdom by 9. G. 4. c. 60.

14. Continuing to 31st December 1836, the 10 G. 4. relating to the government of Western Australia.

15. To continue until 31st May 1838, the duty of excise on soap used in certain manufactures

16. Alters and amends the laws regarding contempt of chancery courts in Ireland.

17. Extends to Ireland the provisions of 1. W. 4. relating to property of insane persons.

18. **EXEMPTION FROM TOLL.**

Clause 1. Enacts that after the 1st January 1836, no toll shall be demanded or taken on any turnpike road for or in respect of any horse, carriage, &c. when employed in carrying dung, or manure for land (except lime) and the implements used for filling the manure, and the cloth, used in covering any hay, &c. that may have been conveyed.

2. This Act not to exempt from any toll imposed by any local Act.

19. To amend and consolidate the laws relating to merchant seamen of the United Kingdom, and for maintaining and forming a register of all men engaged in that service.

20. To consolidate certain offices in the collection of the revenues of stamps and taxes, and to amend the laws relating thereto.

21. To amend and alter an Act of 59. G. 3. relating to line of road from Shrewsbury in Salop, to Bangor Ferry, in Carnarvon.

22. To continue for three years two Acts of 2 and 3. and 3 and 4. W. 4. relating to insane persons.

23. To establish loan societies in England and Wales; and to extend the provisions of the Friendly Societies Act to the islands of Guernsey, Jersey and Man.

24. To encourage voluntary enlistment of seamen, and to make regulations for more effectually manning his Majesty's navy.

25. To extend the accommodation by post to and from foreign parts, and for other purposes relating to the post office.

26. To appoint convenient places for holding assizes in Ireland.

27. To continue certain regulations for the linen and hempen manufactures in Ireland.

28. To remove doubts as to declaration to be made and oaths to be taken by persons appointed to the office of sheriff of any city or town, being a county of itself.

29. For investing in government securities a portion of the cash lying unemployed at the Bank of England belonging to bankrupt's estates, and applying the interest thereon in discharge of the expences of the Court of Bankruptcy, and for the relief of the suitors in the said court: and for removing doubts as to the extent of powers of court of review and of sub division courts.

30. For protecting the revenues of vacant ecclesiastical dignities, prebends, canonries, and benefices, without cure of souls, and for preventing the lapse thereof, during the pending inquiries respecting the state of the established Church in England and Wales.

31. To give validity to certain contracts and presentments for repairing and keeping in repair certain public roads in Ireland, and the sureties entered into for the execution thereof.

32. Enacts that after the 1st July 1836, the present duties on tea shall cease and in lieu thereof, there shall be charged a duty of 2*s*. 1*d*. per pound, which after that day shall be imported, or having been imported shall then be entered for home consumption in the United Kingdom.

33. To prevent vexatious removal of indictments into the Court of King's Bench; to extend the provisions of 5. Wm. and Mary, for preventing delays at the Quarter Sessions of the peace to other indictments; and to extend the provisions of an Act of 7. G. 4. as to taking bail in cases of felony.

34. To amend two clerical errors contained in 9. G. 4.

35. To consolidate the offices of paymaster-general, paymaster and treasurer of Chelsea Hospital, treasurer of the navy, and treasurer of the ordnance.

36. POLLS AT ELECTIONS.

Clause 1 Repeals so much of 2 and 3. W. 4. c. 45, (*Reform Act*) as allows the poll to be kept open two days.

2 Enacts that polling at contested elections shall continue but for one day, from 8 o'clock in the morning till 4 o'clock in the afternoon.

3. Not more than 300 voters shall be allotted to poll in one booth.

4. If candidate shall so require, not more than 100 voters to poll in one booth.

5. In case of such requisition, Sheriff to give public notice of situation of booth.

6. Elector not to be required to take the oaths of allegiance, supremacy, and abjuration.

8. Sheriff, or other returning officer, may adjourn proceedings at election, whether of the nomination, or of taking the poll, in case of any riot, or open violence.

37. For the further reduction of the militia staff, and to suspend the ballot for the militia.

38. For effecting greater uniformity of practice in the government of the several prisons in England and Wales; and for appointing inspectors of prisons in Great Britain.

39. An Act to exempt certain retailers of spirits to a small amount, from the additional duties on licenses; and to discontinue the excise survey on wine, and the use of permits for the removal thereof.

40. To provide for the better collection of the duties on wood, the produce of places in Europe.

41. To amend the law relating to securities given for considerations arising out of gaming, usurious, and certain other illegal transactions.

42. To authorize the granting of superanuation allowances to the commissioners and officers of the courts for the relief of insolvent debtors.

43. Recites the 1 and 2 W. 4 c. 41, which authorizes two or more justices, in case of any tumult, to appoint special constables, to act in any parish in which they reside, and authorizes persons willing to act as special constables, to be appointed as such, for any other parish than that in which they reside.

44. For raising £ 3,521,550 by exchequer bills for the service of 1835.

46. To carry into execution 3 and 4 W. 4 for compensating owners of slaves upon the abolition of slavery.

36. To amend, until the end of the next session of parliament, 2 W. 4. for making provision for dispatch of business now done by the Court of Exchequer in Scotland.

47. Repeals so much of 3 and 4 W. 4. as relates to the amount of the salary granted to the clerk of the crown in Chancery; and to make other provisions relating to the said office.

48. To prevent and more speedily punish offences endangering the public peace in Ireland.

49. Continuing, until the 1st June, 1837, the several Acts for regulating turnpike roads in Great Britain, which will expire on 1st June, 1836, or with the next session of Parliament.

50. HIGHWAY ACT.

Clause 1. Repeals so much of 6. G. 1. c. 6. as relates to the carriage of Bricks, except as to London—18. G. 2. c. 33. except as to London—24. G. 2. c. 43, except as to London—30 G. 2. c. 22. except as to London—13. G. 3 c. 78—34 G. 3. c. 64—34 G. 3. c. 74—so much of 42. G. 3. c. 90. as relates to the exemptiou of any serjeant, corporal, drummer, or private of the militia from performing statute duty—44. G. 3. c. 52—51. G, 3 c. 109. and 55. G 3. c. 68

4. The present surveyor to continue in office, until surveyor appointed under this Act.

6. Inhabitants of every parish maintaining its own highways at their first meeting in vestry for the nomination of overseers to proceed to the election of surveyor for the year then ensuing. The outgoing surveyor may be re-elected. Where there shall be no meeting for the nomination of overseers, the inhabitants contributing to the highway-rate to meet on 25th March in every year, or within fourteen days after, to elect surveyor, who is to repair and keep in repair the several highways in such parish.

7. Any person, living within the parish or in any adjoining parish, having an estate in hereditaments in his own right or in right of his wife of the yearly value of £10., or a personal estate of the value of £100 (such person not living within the parish, being willing to serve) or being an occupier of houses or hereditaments (whether residing within the parish or any adjoining parish) of the yearly value of £20., shall be qualified to be elected a surveyor. Any person now exempted by law from serving as overseer not to be compelled to serve surveyor. Surveyor when elected, may appoint a deputy, who is to be approved of by the justices, by writing under their hands at a special sessions of the highways.

8. Imposes a penalty of not exceeding £20 on person, elected surveyor, and refusing or neglecting to act, or to provide a deputy; and also renders the deputy liable to the same penalty as surveyor.

9. Authorizes the majority of the inhabitants at their meeting to elect a person as surveyor with such salary as they shall think fit.

10. Surveyor on verifying his accounts to deliver to the justices the name of the person appointed to succeed him.

11. In case inhabitants neglect to appoint surveyor, or surveyor neglects to deliver name, or the surveyor being dead, or disqualified or refusing to act, justices may appoint surveyor, with or without salary, until the meeting for nomination of overseers.

12 Where parish stands in more than one county, &c., justices to appoint surveyor out of that part in which the church shall be situate.

13 to 16. Parishes may if they think fit apply to quarter sessions or to petty sessions to be united and formed into districts, and quarter sesssons, or magistrates at a petty sessions may unite same and appoint a person as district surveyor, which union and appointment is to be enrolled by the clerk of the peace with

the records of the court. Such union to form a district for three years, and for twelve months after any one parish shall give notice of intention to cease to form one of the said district; the district surveyor to have the same powers, except in levying rate, and be liable to same penalties as parish surveyor.

17. Notwithstanding union of parishes, a surveyor is to be elected for each parish, but he is only to make and levy the rate and pay same to district surveyor.

18. In a parish where the population exceeds 500 ', a certain number of inhabitants not exceeding twenty nor less than five, may be appointed by a majority of two-thirds of the votes of the vestrymen, to act as a board for the direction of the repairs of the highways,—and they may appoint a collector of the rates, an assistant surveyor, and also a clerk and a treasurer.

19. The board may rent, and, with the consent of the vestry, purchase ground or other premises for the keeping the implements and materials to repair the highways, and may direct how and in what manner the highways shall be curbed or paved with stone or otherwise.

20. Imposes a penalty of not exceeding £5 on surveyor, &c for every offence where no particular penalty is imposed.

21. If any bridge shall hereafter be built, liable to be repaired by the county, all highways leading to, passing over, and adjoining thereto, shall be repaired by the parish, person, &c. who were before bridge erected bound to repair the same.

22. Gives the same powers for getting materials and preventing nuisances, to the surveyor of county bridges, as to parish surveyor.

23. No road hereafter to be made at the expence of any private individual, &c. shall be deemed a highway, until justices at petty sessions, having received notice of such individual's intention to dedicate the same to the public, shall certify that they have viewed the same and that it has been made in a substantial manner and of the proper width, and then, after such individual, &c. shall have repaired the same for twelve calendar months the road shall for ever thereafter be repaired by the parish in which situate.

24. Directs the surveyor of every parish, with the consent of the inhabitants in vestry assembled, or by direction of justices, to erect, where two or more ways meet, a stone or post with the name of the next market town, &c., to which the said highways respectively lead, as well as stones to mark the boundaries of the highway: and to the several approaches to such parts of any highways as are subject to deep or dangerous floods to erect graduated stones or posts to guide travellers in the safest track through the floods; and to secure horse causeways, &c. by posts, &c. from being passed over by waggons, &c.

25. Authorizes surveyor to make a road through the grounds adjoining any ruinous or narrow part of highway (not being the ground whereon a house stands, nor being a garden, &c.) whilst old road repairing; owner and occupier to be recompenced.

26 to 34. Surveyors to remove obstructions in the highways, arising from any cause; may make rate to carry this Act into execution, which is to be allowed by two justices, and published in the same manner as poor rates are; may inspect the poors' rates and make extracts therefrom; no rate to be made by surveyor, at any one time to exceed 10*d* in the pound, or 2*s* 6*d*. in the pound in the whole in any one year, unless with the consent of four-fifths of the inhabitants, when it may be made at such sum as the inhabitants think proper: surveyor to have the same power of compounding with landlords and enforcing same, as overseers have. If any error made in the rate surveyor may alter same, with the consent of justices at a special sessions. Justices may excuse any person, if he is unable through poverty to pay rate, from the payment of same. All property, and owners or occupiers in respect thereof, now exempt from performance of statute duty, &c., not to be rated. Rates to be recovered in the same manner as poor's rates.

35. Authorizes the rate payers, if agreed upon at a meeting to be called for that purpose, to divide among themselves, in proportion to their amount of rate, the carrying the material required by the surveyor for the repairs of the highways, and they shall be paid for such carriage within one calendar month.

36. Authorizes surveyor with consent of vestry to appoint a collector of the rates who is to have the same powers for enforcing payment of same as surveyor would.

37. Surveyor to take security from collector.

38. Directs the collector to make out account of all monies received and paid by him, and pay balance to surveyor, &c.

39. Surveyor in every parish to keep separate account of the monies levied for highway rate.

40. Surveyor, &c. to keep an account of all monies received and paid by him, and such account may be inspected by the inhabitants, gratis.

41 and 42. The property in all books, &c. and materials, &c. to be vested in surveyor for the time being, who is directed to deliver up same, on his quitting office, to his successor.

43. In case of the death of surveyor, &c. his executors are to make up account and deliver up books, &c.

44. Surveyors to make up yearly accounts and lay same before justices at a special sessions for the highways. Surveyors appointed under 13. G. 3. to pass their accounts at special sessions after 25th March, 1836.

46. Authorizes surveyor with consent of vestry to contract for purchasing and carrying materials, but he is to have no share in such contract, nor is he to let to hire any team, or sell any of the materials, without licence from two justices under penalty of not exceeding £10.

47. Any person taking away materials belonging to surveyor, to forfeit not exceeding £10.

48. Authorizes surveyor, with consent of justices to sell land allotted to the parish for materials, when exhausted.

51. Authorizes surveyor to dig and carry away materials from any waste land, river or brook, so that he does not divert or interrupt the course of such river, &c., or damage any building, &c., and may also gather stones lying upon any land, within the parish, and carry them away, without any satisfaction for the materials, but for the damage only in carrying away, having first obtained consent of the owner or licence from justices.

52. Not to extend to sea beach.

53 to 55. Surveyor, upon giving one calendar month's notice to owner and occupier, and no order made by justices to the contrary, may take materials from inclosed lands, making satisfaction to the owners, if he cannot find sufficient in the waste lands, &c. If he shall make any pits or holes in getting materials he is to fill them up, or slope them down, and fence off, under penalty of not exceeding £10.

56. Imposes a penalty of not exceeding £5. on surveyor, for allowing heap of stones &c. to remain on highway at night.

57. Imposes a penalty of not exceeding £5., in addition to his liability to civil action, on surveyor for damaging mills, dams, &c in getting materials.

58 to 61. Directs that where a highway lies in two parishes, justices to determine what shall be repaired by each, and parishes, after such determination, shall repair their allotted parts—not to change boundaries of counties, except for the purpose of repairing such allotted part of highway—the costs of determination to be apportioned by justices.

62. Authorizes justices to order that any highway, repaired by any person, &c. by reason of his tenure, may be made a parish highway.

64 to 66. No tree, &c. to be planted within fifteen feet of the centre of carriage-way. If surveyor thinks that road is prejudiced by the shade of any hedges or by any trees (except trees planted for ornament, or shelter to any hop-ground, house, &c.) owner may be summoned to shew cause why some are not cut, pruned, &c., and no cause being shewn, justices may order same to be done, but not to require it to be done, only between 30th September and 31st March.

67 and 68. Surveyor may make and keep open ditches, &c and lay trunks, &c., through adjoining lands, on paying for any damage incurred, and no person to alter same without consent of surveyor.

69. Imposes a penalty of not exceeding 40s for making any building, &c. within fifteen feet of the centre of highway, and allows surveyor to pull down same.

70. No steam engine to be erected within twenty-five yards, nor any windmill within fifty yards, nor shall any bricks, &c be burnt within fifteen yards from any part of highway unless behind some wall or fence, under penalty of not exceeding £5.

71. Directs proprietors of rail roads to erect gates, where they shall cross highways.

72 and 73. Imposes a penalty on persons committing nuisances on highway.

74 and 75. Surveyor may impound cattle, found straying on highways until payment of penalty of 1s for each head, and the other expenses. Any person guilty of pound-breach, to forfeit any sum not exceeding £20.

76. Enacts that the owner of every waggon, cart, or other such carriage, shall paint in a straight line, or lines, upon the offside, his christian and surname, and the place of his trade or abode, and also his partner's name, &c., at full length in large letters, not less than one inch in height, in white upon black, or black upon white, under penalty of not exceeding 40s.

77. Authorizes one driver to take charge of more than one cart, &c. provided they are drawn only by one horse each.

78 and 79. Enacts that if drivers of waggons, &c. (except those driven with reins) shall ride thereon unless some other person guide them: or if driver cause hurt or damage to others, or quit the road, or drive any waggon, &c. without owner's name, or shall not keep the near side, or shall interrupt the free passage of others, or ride or drive furiously, they shall be subject to a penalty, if driver, only, and not the owner, of not exceeding £5., or if driver be owner, not exceeding £10. If driver refuse to discover his name he may be committed for not exceeding

[illegible] months. Surveyors authorised to detain unknown persons committing offences against this Act, and to take them before a justice.

[illegible] and 81. Enacts that cartways shall be twenty feet wide; horseways, eight feet; and footways, three feet; the width of gates across cartways ten feet; across horseways, five feet.

[illegible] to 95. Relate to widening and stopping up highways, &c.

99. No presentment against inhabitants for highway being out of repair, to be hereafter made.

113 to 117. Not to extend to turnpike roads, nor to roads repaired under local Acts; not to affect the universities, nor the rights and liberties of the City of London, nor the powers of commissioners of sewers.

51. To grant relief to the Island of Dominica; and to amend an Act of 2 and 3 W. 4. for enabling His Majesty to direct the issue of Exchequer bills to a limited amount for the purposes above mentioned.

52. To authorize court of directors of East India Company to suspend the execution of 3 and 4 W. 4. c. 85, so far as they relate to the creation of the government of Agra.

53. To repeal 9 G. 4, for regulating the carriage of passengers in merchant vessels from the United Kingdom to the British possessions on the Continent, and Islands of North America; and to make further provisions for regulating the carriage of passengers from the United Kingdom.

54. To render certain marriages valid, and to alter the law with respect to certain voidable marriages.

55. For facilitating the appointment of Sheriffs in Ireland, and the more effectual audit and passing of their accounts; for the more speedy return and recovery of fines, fees, &c.; to abolish certain offices in the court of Exchequer in Ireland; to amend the laws relating to grants in custodiam and recovery of debts in Ireland; and to amend an Act of 2 and 3 W. 4, for transferring the powers and duties of the Commissioners of public accounts in Ireland to the Commissioners for auditing the public accounts of Great Britain.

56. To regulate the admeasurement of the tonnage and burthen of the merchant shipping of the United Kingdom.

57. To extend to Scotland certain provisions of Act 9 G. 4; to consolidate and amend the laws relating to savings' banks; and to consolidate and amend the laws relating to savings' banks in Scotland.

58. To amend the Acts relating to the hereditary land revenues of the Crown in Scotland.

59. CRUELTY TO ANIMALS.

Clause 1. Repeals 3 G. 4. c. 71, and part of 3. W. 4. c. 19.

2. Enacts that if any person shall wantonly and cruelly beat, or otherwise ill treat any cattle or domestic animal, or shall by negligence or ill usage in the driving thereof be the means whereby any damage or injury shall be done, he shall upon conviction forfeit (over and above the damage (if any) done thereby), not exceeding 40s. nor less than 5s with costs, or in default of payment be committed for not exceeding fourteen days.

3. Any person keeping a house, pit, &c., for bull-baiting, cock-fighting, &c., shall be liable to penalty of not exceeding £5, nor less than 10s. for every day in which he shall keep and use such house, &c., for the purposes before mentioned.

4 to 6. Any person impounding cattle is to provide sufficient food and nourishment for them, (the value of which he may recover of owner) under penalty of 5s. for each days neglect; and in case person impounding shall neglect to feed cattle, any other person may do so.

7 and 8. No person keeping a house or place for slaughtering horses or cattle, (not being for butcher's meat) shall slaughter same, without having taken out a license for that purpose, or without having affixed over the entrance to such place the board and inscription prescribed by 26 G. 3. c. 71, and such person shall kill all cattle brought to them for that purpose within three days, and feed them properly in the interim, under penalty of not exceeding 40s. nor less than 5s. for every day he shall neglect to kill or feed same.

60. For carrying into effect a treaty with the Kings of the French, and of Sardania, for suppressing the slave trade.

61. For carrying into effect the treaty with the Kings of the French, and of Denmark for suppressing the slave trade.

62. An Act to repeal an Act of the present session of parliament, intituled 'An Act for the more effectual Abolition of Oaths and affirmations taken and made in various Departments of the State, and to substitute Declarations in lieu thereof, and for the more entire suppression of voluntary and extra judicial Oaths and Affidavits;' and to make other provisions for the abolition of unnecessary oaths.

63. WEIGHTS AND MEASURES.

Clause 1. Repeals 4 and 5 W. 4. c. 49.

3 Repeals the provisions of 5 G 4 c. 74. and 6 G 4 c 12, which require that all weights and measures shall be models and copies in shape or form of the standards deposited in the Exchequer, and also which allow the use of weights and measures not in conformity with the imperial standard weights and measures established by the said Acts, or allow goods or merchandize to be bought or sold by any weights or measures established by local custom or founded on special agreement.

4. Weights and measures stamped at the Exchequer are declared legal, although not similar in shape to those required by recited Acts. Superintending officer may verify and stamp weights and measures of proper length, weight, and capacity, although not of the form prescribed by 5. G. 4. c 74

5 All copies of the standard weights and measures which may have become defective, or have been mended to be sent to the Exchequer to be re-verified.

6. Enacts that after passing the Act, the Winchester measure, and the lineal measure, called the Scotch ell, and all local or customary measures shall be abolished; and every person selling by any other measure than the imperial measure, shall be liable to penalty not exceeding 40s. for every such sale; provided that articles may be sold in vessels, not represented as containing imperial measure, or of any fixed local or customary measure heretofore in use.

7 Abolishes heap measure, and imposes a penalty of not exceeding 40s. on any person, for every sale by heap measure.

8. Enacts that, as some articles heretofore sold by heap measure, are incapable of being stricken, such articles may be sold by a bushel measure, or aliquot parts thereof, corresponding in shape with the bushel prescribed by 5 G 4. c. 74, filled as nearly to the level of the brim as the size and shape of articles will admit. Articles heretofore sold by heaped measure may now be sold by weight.

9. Enacts that from and after the 1st January, 1836, all coals of every description shall be sold by weight, and not by measure, and imposes a penalty for every sale, of not exceeding 40s. on any person selling by measure, and not by weight.

10. All articles sold by weight to be, from passing of Act, sold by avoirdupois weight, except gold, silver, platina, diamonds, or other precious stones, which may be sold by troy weight, and drugs, which, when sold by retail, may be sold by apothecaries weight.

11. After passing of Act, a stone weight in all cases to consist of 14 standard pounds avoirdupois; an hundred weight, of 8 such stones; and a ton weight of 20 such hundred weight.

12. Contents of weights above 1lb.; and of all measures to be stamped thereon.

13 Weights made of lead or pewter not to be stamped unless substantially cased with brass, copper, or iron, and marked as such.

14. Where contracts exist for payment of rents, tolls, &c., in England and Ireland, in grain or malt, or any other commodity, justices, with a jury of 12 freeholders to ascertain the amount according to the standard of weight or measure by this Act established, and such contracts to be performed according to such determination.

15. Where contracts exist for payment of stipends, feu duties, &c., in Scotland, in grain, malt, &c. Sheriff in each shire, with jury to ascertain the amount according to the standards by this Act established.

16. Enacts that in Scotland the flar prices of all grain shall be struck by the imperial quarter, and all returns of prices of grain shall be set forth by the same.

17. Copies of the imperial standards shall be provided, by order of magistrates, in quarter sessions for counties, in England and Wales, and by meetings of justices in Scotland, within three months after the Act shall direct.

18. Extends the time for operation of Act in Orkney and Zetland, to 1st May, 1836

19 and 20. Copies of standards to be provided by grand juries in Ireland, or in default by judges, and inspectors are to be appointed by them.

21. Magistrates in England, and Scotland, and grand juries in Ireland to provide stamps for the use of inspectors for stamping weights and measures; any person using any weight or measure not authorized by this Act to forfeit, on conviction, not exceeding £5: all contracts, &c made by such weights to be void, and every light or unjust weight to be seized by inspector, and forfeited. Weight above 56lbs. not required to be inspected or stamped, nor any wooden or wicker measure used in the sale of lime, or other articles of the like nature, or any glass or earthenware jug, or drinking cup; but any person may require the contents of either to be ascertained by a comparison with a standard measure.

2. [illegible] of providing [illegible] of [illegible], and [illegible] to [illegible] [illegible] of the [illegible], &c.

[illegible] [illegible] making or selling weights and measures [illegible] [illegible] for discharge [illegible] [illegible] when required.

[illegible] Inspectors to attend at market towns, and other places, when ordered by justices.

[illegible] give power to the inspectors of towns, authorised by any local Act, [illegible] inspectors within the limits of their jurisdictions. Inspectors [illegible] examining weights, &c., if any person refusing [illegible] to forfeit, not exceeding 5l. for every weight, &c.

[illegible] Weighing machines [illegible] to be supplied with beams and scales, and [illegible].

[illegible] Weights and measures once stamped need not be re-stamped.

[illegible] Power to inspectors to inspect weights and measures; and if any are light, or otherwise unjust, they shall be forfeited and destroyed, and the person in whose possession same shall be found to be liable to a penalty of, not exceeding £5, and refusing to produce them shall be subject to a like penalty.

[illegible] and [illegible]. Penalty for counterfeiting stamp on weights and measures, not exceeding £50, or less than £5; and [illegible] for [illegible] not exceeding £10, or less than 40s.

[illegible] Imposes a penalty on any person of 20s. for printing or making price lists, &c., denoting quantity or any weight or measure than the same denomination of imperial weight or measure.

[illegible] Application of penalties;—moiety to informer, and other half to county stock.

[illegible] Repeals 4 Anne, and 5 G. 4 c. [illegible], except as far as relate to duties, &c. of weight masters.

[illegible] Powers of ward inquests in London, &c., not to be interfered with; rights of the Founders Company reserved; rights of Universities of Oxford and Cambridge reserved; not to abridge the power of the leet jury.

64. STAMPS AND ASSESSED TAXES.

Clause 1. Exempts agreements to submit to arbitration, and awards made in Ireland from stamp duty.

2 and 3. Stamp duty in Great Britain and Ireland, on policies of insurance on lives, not exceeding £[illegible] repealed, and in lieu thereof a duty imposed, where the sum insured shall not exceed £50, of 2s. 6d., exceeding £50, and not exceeding £100, of 5s.

4. Enlarges the time required by 4 and 5 W. 4. c. 54, for giving notice of intention to compound for assessed taxes, until [illegible] October, 1835.

5. Makes it lawful for persons keeping four-wheeled carriages drawn by one horse to compound for same.

14 and 15. Repeal the present duties on race horses, and imposes, in lieu thereof, a duty of £3 17s. per annum on every race horse.

16. Enacts that the exemption granted to farmers from the duty on one riding horse, by 4. and 5. W. 4 c. 73, shall extend only to such occupiers of farms under the rent or value in the said Act specified, as obtain their livelihood principally by husbandry on such farms.

17. Exemption granted to military and marine officers, by 52. G. 3. c. 93, Schedule C. for one male servant being a soldier, extended to such number of servants, being soldiers, as may be allowed to each officer by the regulations of the service.

65. To prevent the publication of lectures without consent.

66. To amend the law relating to the customs.

67. For the improvement of the navigation of the river Shannon.

68. Militia pay, &c., and allowances.

69. WORKHOUSE CONVEYANCE ACT.

This Act empowers corporate bodies, trustees, unions, &c., with the consent of a majority of the rate payers to dispose of any lands or buildings for the purposes of a workhouse, or for any other purposes for the relief of the poor which the Poor Law Commissioners may approve of. Power is also given, (with the consent of the Commissioners) to enclose, purchase, hire, or take in any waste, common, or other land, for the purpose of being used as a site of a workhouse, or for any other of the purposes of the Poor Law Amendment Act.

70. IMPRISONMENT FOR DEBT, (SCOTLAND.)

Clause I. Enacts that after the 1st January, 1836, no person shall be imprisoned, in Scotland, for a debt not exceeding £8. 6s. 8d., exclusive of interest and expences.

3. Authorizes sheriff or magistrates to discharge any person imprisoned for a less amount.

4. Not to apply to recovery of fines and forfeitures, or to imprisonment for poor taxes, or local taxation, or for sums decerned for aliment.

71. For appointing Commissioners to continue the inquiries concerning charities in England and Wales, until 1st March, 1837.

72. To abolish the excise incorporation in Scotland, and to transfer the funds of the said incorporation to the consolidated fund, and to provide for the payment of the annuities to the widows and orphans of late and present members of the incorporation fund.

73. To provide that persons accused of forgery in Scotland shall not be entitled to bail unless in certain cases.

74. RECOVERY OF TITHES.

Clause 1. Enacts that no proceedings shall be instituted in any of His Majesty's Courts in England, in respect of any tithes under the yearly value of £10, (save and except in the cases provided for by 7 and 8. W. 3. c. 6 and 55. G. 3. c. 127), but all complaints touching the same shall, except in the case of quakers, be heard before two or more justices of the peace, under the provision of said recited Acts; and that no proceedings shall be instituted in His Majesty's Courts in England or Ireland in respect of any tithes, &c., under the value of £50, withheld by any quaker, but all complaints shall be determined before two justices, under the provisions of 7. & 8. W. 3. c. 34. & 7. 53 and 54. G. 3.

2. No execution to be issued against the person of quaker, but only against his goods.

75. TITHE ON TURNIPS.

Enacts that after passing of Act, in all cases where turnips shall be severed from the ground in order that they may be the more easily and completely consumed, and shall be eaten on the ground by sheep or cattle, and not otherwise removed, the same shall be subject to payment of tithe, in same manner, and to same extent, as if they had not been severed.

76. An Act to provide for the regulation of Municipal Corporations in England and Wales.

77. To repeal the duty and drawback on flint glass, to impose other duties and another drawback in lieu thereof, and to reduce the drawback on German sheet glass, exported in panes; and to repeal the drawback on unground, and unpolished plate glass; and to amend the laws relating to duties on glass.

78. An Act to explain and amend an Act passed in the second and third year of the reign of William the Fourth, for amending the representation of the people of Scotland; and to diminish the expences thereof.

79. o suspend until after 6th April, 1835, proceedings for recovering payment of certain instalments of the money advanced under the Acts for establishing tithe compositions in Ireland.

80. To apply a sum from the consolidated fund, and the surplus of ways and means to service of 1835, and to appropriate the supplies.

81. To abolish capital punishments in cases of letter stealing and sacrilege.

82. To abolish certain offices connected with fines and recoveries, and the cursitors in the Court of Chancery, and to make provision for the abolition of certain offices in the superior Courts of Common Law in England.

83. To amend the law touching letters patent for inventions.

84. To empower grand juries in Ireland to raise money by presentment for the construction, enlargement or repairs of piers and quays.